# electron
## user

# KEYBOARD MAGIC

**Making music
on your
Electron**

**PLAY!** *Compulsive board game
and two arcade classics*

**LEARN!** *Find out how the
Electron works*

**ROM cartridges:
Complete survey**

# CONTENTS

**electron user**

## Bargains galore!

Don't miss our special offers on Pages 50-53.

## Data puts team on top

AN Electron is helping a pub football team show a clean pair of heels to its rivals in the local league.

In fact the machine has brought about a remarkable change of fortune for the Welcome Inn in a Greater Manchester Sunday league.

Last year they won only three matches . Yet so far this season, after losing their opening match, they have won 10 on the run.

Manager Peter Wright has been able to affect this dramatic reversal of previous form, with a little help from his Electron.

"I have the forthcoming week's opponents watched and the data recorded in the machine", he says.

"Also, I have written a program in which I can cross match our strengths with their weaknesses.

"And from this I work out the game plan.

"If an opposition player is reported to be nervous, then the computer suggests he warrants the attention of our

# Electron's rarity value shoots up

THE Electron is now the most sought after machine in the second hand market place.

So much so that the machines often change hands for up to 80 per cent of the current price tag.

News of the upsurge in demand for used Electrons comes from Micro Mart, the leading publication covering the second hand home computer scene.

"One of the reasons for this is that it is such a good machine that people rarely get rid of them", Stewart Summerville of Micro Mart told *Electron User*.

"Consequently when one does come on the market, it fetches a top price.

"If this trend continues then in years to come there is little doubt that Electrons will become collectors' items — and their value could then rocket".

A recent advertisement offering an Electron for sale

ELECTRON & PLUS III Disc Drive, also ROM box TZP3, Elkman, Stargraph, ROMs Database disc, games, books, etc. 10 discs. £180. Phone 0925 30097 ono.

ELECTRON PLUS 1 E2P 2nd Processor, AP4 Disc In/face, View, 13 games tapes £210 ono. Tel. 0268 777324.

ELECTRON PLUS 1 Cumana Disc In/face, Electron User's, lots of s/ware incl. View, *T2CU, all £170 ono. Tel. Northampton 0604 410721

ELECTRON COMPUTER PLUS one, I/F Cumana DFS & Drive & View Word Processor, all for only £160 + P&P. Phone 01 550 8965.

*Recent adverts in Micro Mart*

brought some 50 telephone calls within 48 hours.

"The phone never stopped ringing", said advertiser John Sturrock. "You would have thought I was giving away a Rolls Royce for free from the response.

"As it was, the first person who came on bought it for the price I was asking, though subsequent callers offered me more".

Meanwhile sales of new Electrons are reported to have been heavy over the Christmas period.

"It's a machine whose popularity never seems to wane", said one retailer.

"Fortunately there are some very clever peripheral people in this sector of the market who are constantly enhancing the Electron to keep it up to date.

"And it is also well supported in terms of the software available.

"All of this adds up to the fact that there is little doubt that this is one of the most successful machines in the history of home computing".

# A CHESS CLASSIC FOR THE ELECTRON

THE CDS Software classic Colossus 4 Chess has finally been made available for the Electron.

The program earned its fame by defeating 24 other computer chess games in a gruelling series of 16-game matches and it's generally acknowledged to be the strongest of its type on the market.

With its backtrack facility, problem-solving mode and handicapping feature, Colossus 4 Chess provides beginners with a friendly tutor and veteran players with a tough opponent.

The program was written by Martin Bryant, author of White Knight 12 – coincidentally one of the games beaten by Colossus 4 Chess. Cassette price £9.95.

Also new from CDS is Brian Clough's Football Manager, a combination board and computer game simulating the trials and tribulations of a soccer boss.

Two to five players can take on the role of team manager competing against each other and the computer. Price £14.95.

# Hits from combined forces

THANKS to recent cooperation between two leading software houses, Electron owners can now buy eight top-selling games at a fraction of what they cost when they were originally issued.

Acornsoft and Superior Software have combined forces to produce Acornsoft Hits Volumes 1 and 2.

Volume 1 contains Magic Mushrooms, Planetoid, Maze, and Monsters. Volume 2 includes Starship Command, Arcadians, Meteors, and Snooker.

The dual cassette packages cost £9.95 each.

Superior Software managing director Richard Hanson told *Electron User*: "These are quite definitely the best compilation packages ever produced for the Electron.

"Previous compilations have got to number one in the software charts, and I'm sure both volumes of the Acornsoft Hits will also.

"It's hard to say which package will prove the most popular — we've aimed at achieving an equal balance, with Magic Mushrooms heading Volume 1 and Starship Command the prime title on Volume 2".

# Sporting Electron

## *From Page 5*

player known as King Kong.

"With a bit of luck thrown in as well, we seem to have got it licked".

Regulars at the Welcome Inn who support their team have been amazed by the way their lads have improved.

"They were a total load of rubbish in the past", one told *Electron User*.

"But this computer thing seems to have spurred them on in a way I would have thought was impossible before.

"It's not turned them into a team which would worry Manchester United, but they'll do for us".

# It's showtime again

THE record-breaking Electron & BBC Micro User Show returns to Manchester next month for the fourth time.

The show will take place at the Renold Building, UMIST on March 20, 21 and 22.

The Northern showcase for all that's new on the Electron scene looks set to be an even greater success than its predecessors.

More than 10,000 enthusiasts visited the last Manchester show, held in September.

Organiser Database Exhibitions is confident that an even larger number will attend the coming event, which has over 70 companies exhibiting and a host of new products available for the Electron.

Once again the Acorn Theatre will be a prominent feature of the exhibition, and leading micro experts will be on hand to provide information on the latest peripherals and software.



# Caring for your stocks..

TO serve the growing army of stock market investors with moderate means, Squirrel Software has added to its Care Utility series.

Investment Care for the Electron is also for experienced investors, but it has been inspired by recent public share offers.

"The program has been written with the new breed of more modest holders of TSB, British Telecom and British Gas shares very much in mind", Squirrel managing director Alan Turner told *Electron User*.

"It produces several statistics which should help these people decide when best to sell in order to convert their paper profits into cash".

Investment Care keeps track of unit and investment trusts, stocks and shares, producing displays of purchase and bid details for each investment.

Printouts of current holdings, sales in current tax year, and dividends received are available.

Offer and bid prices are easy to enter, and the true position of the user's portfolio can be seen at a glance.

Investment Care costs £13.95, or £24.95 when bundled with Cash Care, Building Society Care and Vat Care utilities.

# Rombox winners

MANY thanks to the 711 readers of *Electron User* who sent in entries for the Slogger Competition in the November issue.

It took quite a while to read every single slogan, but eventually we chose 15 top class entries. The prizes are already on their way to the winners.

First prize: A Rombox Plus and Starword to Joseph Hornsby, age 12, from Torquay for "Slogger Ltd Opens the Gates to Genius with Exceptional Results".

Second: Rombox and Starword to Andrew Hardy, age 13, from Dorset for "Slogger Leaves Others Grounded by Getting Everything Right".

Third: Rombox and Elkman to Ian Cameron, age 32, from Inverness for "Still Leading Others at Generating Goods for the Electron Range".

Other prizes: Mark Bullard, Plymouth; V Hayter, Milton Keynes; B L Smith, Slough; Lex Lagoon, Kent; Trevor Coatsworth, Cleveland; C Shipton, Bristol; Timothy Medcraft, Faversham; Richard Gibson, Winchester; David Moore, Clwyd; Alexis Adamou, Brentwood; Chay Ireland, Northants; Simon McCormick, Strangford; Douglas Cartwright, Ilford; M.D. Russell, Newton Abbot; Simon Hopkins, Retford.

## CHART-TOPPER FLIES IN

LATEST release for the Electron from Bug-Byte is Skyhawk, a shoot-em-up game that has been a chart topper on other micros.

Converted by Tennis author Margaret Stanger, it requires the player to protect his Skyhawk fighter plane against flights of enemy aircraft scrolling over the screen. Price £2.99.

# Your chance for immortality



BIG news this month! Larsoft, a brand new adventure software house specialising in the Electron, has been formed by Geoff Larsen who will be a familiar contributor to regular readers.

Based at 4,Chantry Road, Clifton, Bristol BS8 2QD, to date Larsoft has released three titles: The Rising of Salandra (a two part fantasy), Wychwood and The Nine Dancers.

After some hours plotting my way through the third of these I have to conclude that it is superb value for money at only £3.95.

All three adventures are very professionally packaged and from previews appear error and bug free.

Not to be outdone, a passing raven told me that Potter Programs has recently released six new adventures.

There's a pack of four, including Inner Space, Hexagram of Trutania Valley, Stranded on Iloofrax and Philosopher's Stone for only £5.95.

And the other two titles, priced at just £2.95 each, are Flint Strikes Back and Grounded.

If these adventures follow the standard of Twin Orbs of Aalinor they will be well worth buying.

Meanwhile, news from Essex is that Shards is offering the first six people to complete its adventure, Operation Safras, the honour of being characters in the next blockbuster release.

This is your chance to be immortalised on software!

Two more regulars to this column, Harry Bastien and Les Shipton, have earned themselves the distinction of officially becoming the first adventurers to conclude Robico's Myorem.

They now go into a final draw for that £100 first prize. May I offer my sincere congratulations to both of them and add that they beat me to it by a fair number of days!

While on the subject of Robico — a runner from South Wales brought me a scribbled note from Rob O'Leary to say that complete hint sheets are now available for Rick Hanson and Project Thesius.

To obtain one, all players need do is return their old help cards with a stamped addressed envelope.

It will come as no surprise to readers of this column and connoisseurs of text adventures to see that Robico dominates the top ten in popularity.

The only reason that Myorem isn't number one, in my opinion, is the relatively short time it has been available.

It's good to see old favourites such as Sphinx and Sadim Castle still up there in the chart.

But it's perhaps surprising to see Epic toppled so violently – where is Kingdom of Klein or Quest for the Holy Grail?

I also find the great popularity of Terrormolinos and Hampstead interesting – it proves that we have a sense of humour!

Don't forget that this is your chart so keep those votes coming in and the next Top Twenty should appear in three months time.

I would like to thank Emma Rutherford of Nene College for her superb maps to Philosopher's Quest and Circus Adventure. There's a copy of Myorem on its way to you, Emma.

And there is a copy of Adventure Soft's Rebel Planet waiting for the first full solution I receive to Castle of Riddles – I am absolutely flummoxed by this one.

I have just received Robico's Enthar Seven.

I know that the Mad Hatter has already reviewed this adventure, but I must just add that if you want an excuse for buying a disc drive, then this is it!

Sheila Beattie has suggested that to help readers when ordering back issues of Electron User, I should mention the issues where help has been given for certain adventures.

It would be impossible to do this for all adventures, but I will occasionally do it for the more popular games.

Here goes: Help has been given for Woodbury End in the following issues of Elec-

## KNIGHTS OF THE ROUND TABLE

This section is devoted to more experienced adventurers who have offered their services to other readers having difficulties with specific adventures.

If you write to one of my Knights please remember to enclose a stamped addressed envelope.

Kneel and rise:

Sir Toby Edwards of Woodhill Cottage, Neighbourne, Oakhill, Nr. Bath, Avon BA3 5BQ, who offers help with:

Adventure, Adventureland, Stolen Lamp, Woodbury End, Spiderman, The Incredible Hulk, Mystery Fun House, Pyramid of Doom, The Count, Wizard of Akyrz, Wheel of Fortune, Castle Frankenstein, Quest for the Holy Grail, Classic Adventure, Kingdom of Klein, Philosopher's Quest, Super Agent Flint, Eye of Zoltan, Galadriel in Distress, Pettigrew's Diary, Five Stones of Anadon, Stranded, Terrormolinos, Ghost Town, Castle Quest, Ring of Time, Twin Kingdom Valley, Gisburne's Castle, Bored of the Rings, Castle of Riddles, Greedy Dwarf and Fantasia Diamond.

What do you do in your spare time Toby?

## OVERTURE AND BEGIN

Last month I suggested that you take an exploratory ramble through your new adventure.

However, if you want to achieve a modicom of success as an adventurer, progress must be much more methodical.

When Theseus slew the Minotaur in the labyrinth of Minos he ensured his safe return by leaving a trail through the maze with a ball of wool.

Like Theseus (unless you have a photographic memory) it is almost obligatory that you make a map of your route.

Essentially there are three types of map for solving text adventures – grid, random and logical. The first two are pictorial representations, the last a written route.

Once I have explained

tron User: February, April, June, July, August, September and December 1986, and January 1987.

Help for Twin Kingdom Valley has been offered in: June, July, November, December 1985. Also January, February, April, September 1986 and January 1987.
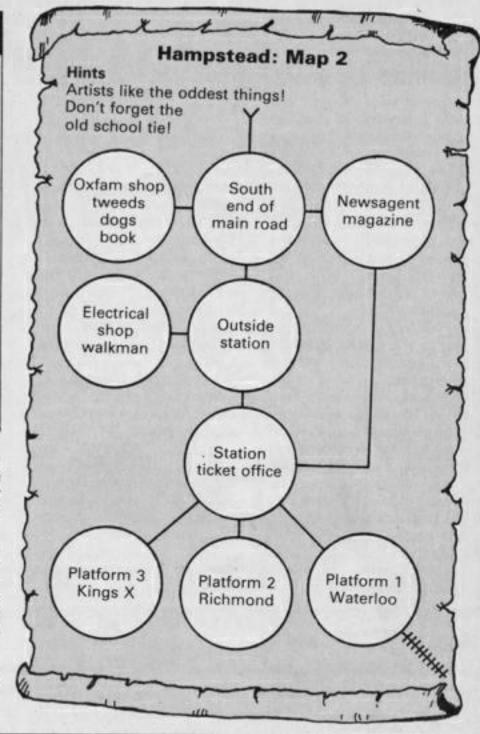
I hope that is of use to quite a few people.

I received a very interesting letter this month from Mrs Pat Winstanley. She runs a club and magazine called Adventure Contact for authors of home-penned adventures.

If any of you are taking seriously your Quill, Adventurescape or Graphic Adventure Creator, or are interested in writing your own machine code adventures then write to:

Adventure Contact, 13 Hollington Way, Wigan WN3 6LS, for more details.



**Hampstead: Map 2**

**Hints**
Artists like the oddest things!
Don't forget the old school tie!

---

**NERS**

each, you can choose the type most suitable for you.

Let us begin with the grid map: Presuming that you do not yet possess one of my adventure mapping grids which I mentioned last month, you need to equip yourself with a piece of graph paper, a pen and a ruler.

Let each 2cm square on the paper represent a possible location in your adventure.

If you are a little unsure of your compass directions, draw a small diagram on the edge of your graph paper (North going up, East going right and so on). For simplicity we will call each location you visit a ROOM.

Begin playing your adventure and in the centre square of the paper inscribe briefly the room description.

For instance in my example from Sphinx Adventure in Figure I, I have called the first location Top Mountain.
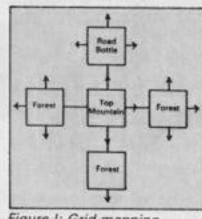


*Figure I: Grid mapping*

Now take note of any information you are given referring to your various exits. Mark small arrows from your square in the direction of the available routes.

As you travel around, mark the new places you find in the relevant adjacent squares to your starting room.

For instance, moving South, East or West from Top Mountain I find I am lost in a forest, yet travelling North I discover a road.

It is also essential that you note in the appropriate squares any objects or treasures discovered. Thus in the first room north I find a bottle – which I also take.

I remember vividly when exploring Quest for the Holy Grail, I found myself in a cave with an open hole in the roof but no means of reaching it. I then remembered a ladder I had seen at a much earlier room.

Thankfully I had noted its location and a quick sortie back enabled me to take the ladder and progress up through passages in the cave.

If you run off the graph, simply start on the opposite edge of another sheet of paper and mark reference arrows to show where sheets join.

The same applies if you ever have to climb up or down. You simply start in a corresponding square on a separate sheet and make that paper level +1 or −1 and so on.

This mapping technique works with all adventures which follow logistical compass routes such as Rick Hanson or Castle Frankenstein.

But for others like Classic Adventure you will need to adopt a random mapping procedure. For that you will have to read next month's column!

## PROBLEMS SOLVED

W.E. Trevelyan has supplied a superb listing to cope with the bug in the save game facility in many copies of Woodbury End.

Early versions of this game allow you to save your position and later reload it but don't allow you to go on with the game and save a later position.

This listing is an alternative to the loader program with the loading screen eliminated.

It enters data into zero page, loads the main program, inserts the oscli routines for save/load and runs the main program.

Data files can then be saved and reloaded any number of times during the game.

Type in Program I, save it with the filename LWOOD then type in:

```
PAGE = &5800
CHAIN "LWOOD"
```

When it has loaded insert your Woodbury End tape.

I am also grateful to Damon Wingfield for his plethora of tips and solutions to a variety of adventures, including Voodoo Castle, T.K.V., Secret Mission and Sorcerer of Claymorgue Castle.

I shall pass these on in due course to readers who have difficulties with these adventures.

I must point out that I am unable to give any help with Myorem until after 30th April, which is the closing date for Robico's competition.

Then, judging by demand, I may just do a special on this superb

```
 10 REM Woodbury Save      e$)
 20 REM by W.E.Trevelyan   600 NEXT
 30 REM (c) Electron User  605 REM
 40 REM PAGE must be &5800 610 start=&5200:end=&5800
 50 MODE6                  620 $&810="SAVE"+" "+file
500 ?&81=&49:?&80=&5E:?&8  $+" "+STR$ ~start+" "+STR$~
3=&4E:?&82=&54:?&85=&4F:?&8 end
4=&4C:?&87=&28:?&86=&F0:?&8 630 RESTORE1010
9=&49:?&88=&98:?&8B=&4F:?&8 640 FOR I%=0 TO 4
A=&16                     650 READ byte$
510 ?&7B=0                 660 I%?&3046=EVAL("&"+byt
515 VDU23;8202;0;0;0;      e$)
520 REM                    670 NEXT
530 *LOAD WOOD             680 REM
540 file$="DATA"           690 *TAPE
550 $&800="LOAD"+" "+file  700 CALL &490C
$                          900 END
560 RESTORE 1000           1000 DATA A2,00,A0,0B,20,F
570 FOR I%=0 TO 6          7,FF
580 READ byte$             1010 DATA A2,10,4C,7A,30
590 I%?&3078=EVAL("&"+byt
```

*Program I*

adventure.

While on the subject of specials, next month I aim to give extended help —

including a cassette offer — on The Ferryman Awaits, which seems to be foxing a lot of people.

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# Mission worth waiting for

PROFESSOR Elvin Atombender, well known computer genius and psychopath, has hacked into the military computers of the major nations.

Within six hours he will have deciphered the launch codes and started world war three. This is how long you are allocated to penetrate his underground stronghold and find the control centre.

The professor's hideaway is a 32 room complex criss-crossed by a network of lifts and it is in one such lift that your mission begins.

Exits to the left and right can be explored or you can press the down key and the lift will descend to the next level.

Your footsteps echo as you leave the lift and run along the corridors — running off the screen causes the adjoining room to be displayed. This is made up of a series of catwalks, some of which can be accessed using mini lifts.

All the rooms are patrolled by the professor's robots which are sensitive to movement and armed with high voltage electrodes.

Using the lifts in the correct sequence will help you to avoid most confrontations with the metal menaces. When an encounter is unavoidable you must rely upon your athletic prowess and split second timing to somersault over the approaching robot.

To enter the professor's control room you need a nine digit code, doled out a digit at a time as you complete a series of sub-puzzles.

Puzzle sections are hidden in the furniture to be found in each of the rooms, as are passwords which can be entered into any of the professor's security terminals.

You search the furniture by standing in front of it and pressing the down key. A searching indicator is displayed, and you keep your finger on the key until the bar reaches zero.

At this point you will be told what you've found, but quite often you won't find anything.

All rooms contain at least one security terminal. Accessing this will enable you to immobilise the robots for a while or reset the lifts to their original position.

The robots only suffer a temporary paralysis so be prepared to take evasive action at the first sign of their re-awakening.

To help you solve the sub-puzzles you have been provided with a pocket computer which can be used to manipulate the puzzle pieces that you have collected.

It has taken a few years to get here but the wait has been worthwhile. Impossible Mission is a very good conversion from the Commodore original.

**Steve Brook**

| | |
|---|---|
| Sound | 6 |
| Graphics | 9 |
| Playability | 9 |
| Value for money | 9 |
| Overall | 9 |

# Licensed to confuse

IT'S always difficult to follow an outstanding success and with Woodbury End Shards almost made a noose for its own neck — it was that good. Hence I have to admit that I am a little disappointed — perhaps expectedly — with Operation Safras.

"Your name is Rupert James Pettigrew. Your occupation, chartered accountant in the City of London. No particular vices or discernable marks. Single, aged 31, avid stamp collector . . . in fact a totally boring individual."

Yet, as many readers will be aware, Pettigrew is of course a secret agent extraordinaire!

You begin the adventure standing by a disused lift and a quick sortie EAST reveals a fiver. Keep this lucky find as it provides a means of bribing information from a tramp later in the game.

Meanwhile, you soon discover a man standing in the shadows, but he's not there to make small talk. Questioning him elicits the response, "You can trust the triplets but beware of the one they call Iron Fist."
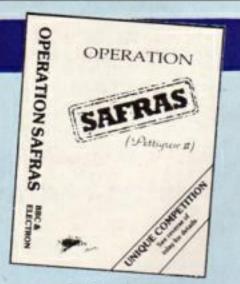
One word of warning — the clues in this adventure are as cryptic as we have come to expect from Steve Maltz, but are totally logical in retrospect.

The aim of the adventure is to rescue five fellow agents who have been secreted in various corners of Great Britain. Then you must use the information gathered to find the Safras sword.

An interesting transport system operates in this adventure, which I hope is expanded upon in future offerings. By pressing T you are presented with a map of this glorious country of ours, and using an unlimited rail ticket you are able to visit such tempting places as Carlisle or even Stockport!

In your travels you pick up various clues and hopefully unravel an intriguing mystery. If you succeed and register your name with Shards you could find that you are immortalised in their next blockbuster adventure.

I must admit that I found the wood in Newport a bit of a puzzle, but as usual X marked the spot. There was also an odd piece of head-banging to overcome in Dundee!

However, it was pleasant to be reunited with old friends like Annie Gramm again, even if I was more than frustrated on occasions.

The adventure claims to be a sequel to Pettigrew's Diary but bears little similarity to that other Shards classic, either in make-up or plot. Don't get me wrong — I enjoyed Operation Safras as a very professional and at times thrilling adventure. Perhaps I'm really waiting for Return to Woodbury End!

**Pendragon**

| | |
|---|---|
| Presentation | 8 |
| Atmosphere | 7 |
| Frustration factor | 8 |
| Value for money | 8 |
| Overall | 8 |

# Quality package
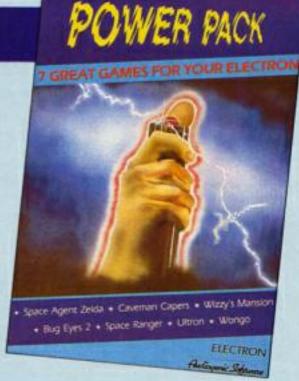
POWER Pack is a compilation of previously released Audiogenic hits with the occasional new game thrown in for good measure – seven games in all, recorded over both sides of two cassettes.

Space Agent Zelda is the heroine of a very classy ladders game. Penetrate the 10 levels of a space ship and destroy its generator before the ship reaches Earth.

Space Ranger is a small screen version of that minor arcade hit Lunar Rescue. Teams of astronauts are stranded at five different sites on the moon – your mission is to fly down through an asteroid storm, landing at each site in turn to rescue the men.

Bug Eyes 2 is one of my all-time favourites and uses the biggest, brightest sprites you've ever seen. Space agent Zelda has been captured by the bug-eyed aliens and incarcerated in the depths of a desolate asteroid: As agent Starman you search for the 25 keys needed to free her.

Caveman Capers follows the exploits of Ogg the caveman as he strives to master a new form of transport – turtle power. Riding an uncooperative turtle you leap over pot holes, avoid low-flying birds, duck beneath snakes hanging from trees and deduce how to jump the toadstools.

Ultron is a shoot-'em-up space game based loosely on the arcade game Gorf. As pilot of the Ultron space fighter you have to destroy three different waves of aliens before you come face to face with the mothership. Blast that and everything starts again but this time things are a little more hectic.

Wizzy is the tale of woe of a second rate wizard whose attic has been occupied by an unfriendly monster. The pages of his spell book are scattered throughout his mansion's 50 rooms, and without putting them together he can't cast a spell to banish his unwelcome guest. The graphics have received very little thought and the game soon becomes tedious.

Wongo is the bomb disposal expert assigned to defuse terrorist bombs that have been planted along the great wall of China. The game is a crude Hunchback clone in which you leap over cannon balls and avoid low flying arrows while trying to render the bombs harmless.

With the exception of the last two titles all the software is of high quality and the package is excellent value for money.

**Carol Barrow**

| | |
|---|---:|
| Sound | 8 |
| Graphics | 8 |
| Playability | 9 |
| Value for money | 9 |
| Overall | 8 |

# Memory galore with disc DFS

WAY back in the February 1986 issue of *Electron User* I reviewed Advanced Computer Products' 1770 DFS. This is a rom which provides Plus 3 owners with a DFS compatible with that used in the BBC Micro.

Both the BBC B+ and Master use 1770 DFS's and these are also designed to be compatible with the old 8271 DFS in the original BBC model B.

With ACP's 1770 DFS Electron users have the ability to access BBC B, B+ and Master discs, which greatly increases the amount of software available to them. In fact the only stumbling block is that the Plus 3 uses 3.5in discs whereas 5.25 is the standard on the BBC Micro. Still, you can always add a 5.25in second drive.

Now the same DFS is available on disc for Electron owners with ACP's sideways ram cartridge. Simply insert the cartridge in one of the Plus 1's sockets, boot up the disc and you've got a 1770 DFS.

If you want to know what ACP's DFS is like take a look at the February issue – the disc version is identical except that it runs in sideways ram and not rom.

So what are the advantages of having the rom on disc? After all it ties up the sideways ram preventing it from being used for anything else.

The advantage of the disc DFS is that it disables the ADFS and resets PAGE to &E00. This is the same as on an unexpanded Electron.

Compare this to &1D00 with just ADFS, &1900 with DFS and &1F00 with both ADFS and DFS. With ADFS you lose nearly 4k of memory whereas with ACP's E00 DFS you don't lose any.

It avoids memory problems with long programs and the hassle of downloading software.

Programs which need PAGE to be at &E00 can still access the disc as normal. Downloaded software cannot do this and must select the tape filing system.

After *FX200,2 and Control+Break the ADFS is restored, PAGE reset to what it was originally and you've got both ADFS and DFS.

ADFS can be selected with *ADFS and DFS with *DISC. This enables you to transfer your files to DFS discs. Simply select ADFS, load the file, select DFS and save it.

I thought the 1770 DFS was superb but the E00 DFS is even better! I can recommend it to all Plus 3 owners.

**Roland Waddilove**

# Over from Channel 4

MACSEN is a past master at converting successful TV programs for computers and in this case the target is the popular Channel 4 game show Treasure Hunt. The game comes with four sets of data covering South Devon, London, Anglesey and East Scotland.

The basic idea is simple. You are given a cryptic clue of the sort you might find in a crossword. This gives you the name of your next location and you must fly your helicopter there and collect another clue. This continues until you have solved all the problems.

For example, your first clue might be "Fly to an occidental bad actor or pig meat", which means a location in East London renowned for its bubbly football team.

When you arrive there you have to walk to "The beheaded Queen's field where Alf Garnet likes to go". Some of the clues have a third section to make them even harder.

You are not on your own in this treasure hunt. Macsen has supplied you with a guide book for the three areas away from London and a map of the metropolis.

You'll need the guide book because a detailed knowledge of the local geography is required. The London map is nearly useless and I used one with a larger scale and much more information.

The only section I have completed is the one covering the London area and this required a quick peek into the computer memory to solve one clue which had me beaten.

In all there are 10 clues to find and to win you must find them in 30 minutes. Most of the time you will spend flying the helicopter, which takes an age to fly from place to place. You will need to be pretty slick with your typing to complete the task in the set time.

If you can't solve a clue you've had it. There is no help so all you can do is fly aimlessly until your time is up. If you can solve all 10 clues you get a final screen which is hardly worth looking at.

You can choose to have a tune playing during the game but I would hardly describe the collection of discordant squeaks as musical.

I actually quite enjoyed the game.

The map of the area you are working on is neatly drawn, and the puzzles were difficult to solve but not impossible. The program is crammed with geographical data and you can end up with a crowded map, full of places which you don't need to complete the task but which do add interest.

Without this extra geography, the clues could be written on a small piece of paper and I feel this is one of those occasions where the computer adds little to the idea.

However, if you get hooked, Macsen offers extra data tapes, with new treasures to hunt, for £5.95.

**Rog Frost**

| | |
|---|---|
| Sound | 0 |
| Graphics | 7 |
| Playability | 5 |
| Value for money | 4 |
| Overall | 4 |

# Gallons of gore

I MUST start by stating that I have not been greatly impressed by Kansas City's previous offerings, though they were better than a lot of the trivia posing as adventures which can be bought today.

However, The Ferryman Awaits is a marked improvement which will keep many of you up until the early hours of the morning trying to fathom out who, why, what or how.

Kansas boasts that this adventure contains about 60k of text — some of which admittedly is used in the introductory passage — and room descriptions are evocative if rather macabre.

Instructions are given in simple sentences, usually no longer than five words — certainly a welcome improvement on Ring of Time.

The adventure is one of the most gory I have come across and as such should give immense pleasure to horror buffs.

It is also riddled with dry humour — try this offering: "You play Mold, son of Mold, grandson of Mold. Your previous job was that of Dung Heaper for the City of Furgle. One of the perks of the job was permission to sleep near the warmth of the dung pits! Your present employment is part-time human sacrifice!"

Unfortunately the adventure is also riddled with spelling mistakes — I noticed unfortunatly and hidiosly on the first couple of screens. This is becoming all too common with recent releases.

Some of the problems are rather obscure and complicated, chiefly because the game has such a small vocabulary that you can do little except GET and DROP objects. It's a good idea to keep your eyes peeled for any hint that may lurk in the room descriptions.

Good imagery is created by more than six screens of introduction, which set out your task for you in black and white.

It seems you are doomed to wander the wasteland of Juh which appears to be wholly peopled by demons, pirates, devil worshippers and deformed creatures.

You are apparently filling the role of hero-adventurer after you made frantic attempts to leave your last employment (I can't for the life of me understand why).

As the adventure opens, you find yourself lying across a stone table waiting to be sacrificed by a crazed priest. You are "magically paralysed from the neck down" and your only salvation is to utter the immortal word: Nimlax.

If you enjoy a plethora of blood and guts and can tolerate the "Righty oh, matey" response to almost all you do then this adventure is for you. Otherwise I suggest you try Database's Magic Sword!

**Pendragon**

| | |
|---|---|
| Presentation | 5 |
| Atmosphere | 8 |
| Frustration factor | 8 |
| Value for money | 8 |
| Overall | 7 |
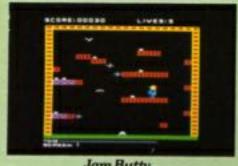
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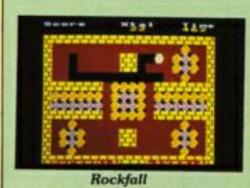
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**Paint Roller:** *Steer a speeding roller, run over paint pots but keep clear of the rocks.*

# ELECTRON KEYBOARD PLAYER

By **OLIVER BISHOP**



**HERE is a utility that enables you to use your Electron as an electronic organ. The screen displays a large piano keyboard, a list of commands, the current mode – play, record or playback – the amount of memory free and the tempo.**

An arrow at the bottom of the screen points to the note to be played and can be moved left and right using Z and X or player one analogue joystick left and right.

To play the note press Return and hold down S as well if you want it sharp, or F for flat. With joystick move up for sharp, down for flat and press fire to play the note.

Several additional commands are only available from the keyboard. Press P to enter play mode. You can move up and down the keyboard and play any of the notes.

Press R for record mode. Now anything you play will be recorded. There is room for 250 notes and the amount of memory left is constantly updated on screen.

Only the pitch of the notes is recorded, so you can pick out the tune at your own speed and play it back at the correct tempo.

Pauses can be included by pressing V. You'll need these if you want to play several notes of the same pitch, like the first two bars of Jingle Bells.

If you play a wrong note press Delete and a high pitched beep will tell you that the last note has been erased from memory. Press C to clear the whole tune from memory.

Use < and > to set the tempo and press B for automatic playback. A tempo of 10 is a note length of half a second, 20 is one second, 30 is one and a half seconds and so on.

You can press Escape at any time to stop the tune. It does not erase the tune memory.

An alternative way of playing back a recorded tune is selected by pressing K. Now the notes are played as you tap the spacebar so you can concentrate on your timing and rhythm.

Finally, Table I shows a summary of all the keys.

| Description | Keyboard | Joystick |
|---|---|---|
| Arrow left | Z | left |
| Arrow right | X | right |
| Sharp | S | up |
| Flat | F | down |
| Sound note | Return | Fire |
| Delete note | Delete | Delete |
| Play mode | P | P |
| Record mode | R | R |
| Clear memory | C | C |
| Auto playback | B | B |
| Key playback | K | K |
| Pause | V | V |
| Tempo up | > | > |
| Tempo down | < | < |

*Table I: A summary of all the commands*

## VARIABLES

| | |
|---|---|
| joy | Flag for joystick. |
| TT | Number of notes used so far. |
| SH | TRUE if note is a sharp. |
| FL | TRUE if note is a flat. |
| n() | Note in memory. |
| RR | Tempo. |
| REC | TRUE if recording. |
| so | Current note being played. |
| T | TRUE if note being sounded. |
| A,B | Position of arrow. |

## PROCEDURES

| | |
|---|---|
| blank | Deletes arrow from screen. |
| key | Draws the keyboard. |
| test | Tests to see what keys are being used. |
| play | Sounds the selected note. |
| playtune | Plays back a recorded tune. |
| clear | Clears the tune. |
| pt | Changes the tempo. |

## Keyboard Player listing

```
   10 REM Keyboard Player
   20 REM By Oliver Bishop
   30 REM      And
   40 REM Julian Bishop
   50 REM Philip Jefferies
   60 REM Jonathan Price
   70 MODE4:PROCtitle
   80 ON ERROR IF ERR=17 GO
TO 430 ELSE MODE 6:REPORT:P
RINT" at line ";ERL:END
   90 IF A$="J" THEN joy=TR
UE ELSE joy=FALSE
  100 TT=0
  110 QQQ=0
  120 SH=FALSE:FL=FALSE
  130 DIM n(255):RR=10
  140 REC=FALSE
  150 so=52
  160 T=FALSE
  170 MODE 4:VDU23,1,0;0;0;
0;
  180 PROCpt
  190 MOVE0,900:DRAW 600,90
0:DRAW 600,1000:DRAW 0,1000
:DRAW 0,900
  200 MOVE0,904:DRAW 596,90
4:DRAW 596,996:DRAW 4,996:D
RAW 4,904
  210 MOVE 0,880:DRAW 600,8
80:DRAW 600,400
  220 MOVE 0,876:DRAW596,87
6:DRAW 596,400
  230 MOVE 0,400:DRAW 0,880
:MOVE 4,400:DRAW 4,880
  240 MOVE0,404:DRAW 1279,4
04:MOVE 0,408:DRAW 1279,408
  250 MOVE 600,600:DRAW 127
9,600:DRAW 1279,400
  260 MOVE 600,604:DRAW 127
4,604:DRAW 1274,400
  270 VDU 4
  280 PRINTTAB(22,3);"COMPU
TER"
  290 PRINTTAB(22,5);"KEYBO
ARD"
  300 PRINTTAB(22,7);"PLAYE
R.."
  310 IF joy=TRUE PRINTTAB(
22,10);"Joysticks" ELSE PRI
NTTAB(22,10);"Keyboard"
  320 VDU 5
  330 VDU4:IF REC=TRUE THEN
PRINTTAB(2,2);"RECORD MODE
" ELSE PRINTTAB(2,2);"PLA
Y MODE    "
  340 RESTORE 1440:FOR A=5
TO 18:READ A$:PRINTTAB(1,A)
;A$
  350 NEXT
  360 PROCnotes
  370 PROCkey
  380 A=25:B=60
  390 MOVE 0,0:DRAW 1279,0
  400 VDU23,224,24,60,126,2
55,255,24,24,24
  410 VDU 5:Q=75
  420 MOVE25,60:PRINTCHR$(2
24)
  430 REPEAT
  440 SH=FALSE:FL=FALSE
  450 IF joy=TRUE AND ADVAL
(1)/256=255 THEN PROCblank:
A=A-Q:GOTO 550
  460 IF joy=FALSE AND INKE
Y(-98) THEN PROCblank:A=A-Q
:GOTO 550
  470 IF joy=TRUE AND ADVAL
(1)/256=0 THEN PROCblank:A=
A+Q:GOTO 550
  480 IF joy=FALSE AND INKE
Y(-67) THEN PROCblank:A=A+Q
:GOTO 550
  490 IF joy=TRUE AND ADVAL
(2)/256=255 THEN SH=TRUE
  500 IF joy=FALSE AND INKE
Y(-82) THEN SH=TRUE
  510 IF joy=TRUE AND ADVAL
(2)/256=0 THEN FL=TRUE
  520 IF joy=FALSE AND INKE
Y(-68)THEN FL=TRUE
  530 PROCtest:IF T=TRUE TH
EN PROCplay:T=FALSE
  540 UNTIL 0
  550 IF A<0 THEN A=1225
  560 IF A>1279 THEN A=25
  570 MOVE A,B:VDU 224
  580 PROCtest:IF T=TRUE TH
EN PROCplay:T=FALSE
  590 UNTIL 0
  600 :
  610 DEF PROCblank
  620 GCOL 0,0
  630 MOVE A,B:VDU 224
  640 GCOL 0,3
  650 ENDPROC
  660 :
  670 DEF PROCkey
  680 MOVE 0,80:MOVE 1279,8
0:PLOT 85,0,400:PLOT85,1279
,400
  690 GCOL 0,0
  700 DIMT(40)
  710 QW=0
  720 RESTORE 1300
  730 FOR A=0 TO 1279 STEP
75
  740 IF A=150 OR A=375 OR
A=675 OR A=900 OR A=1200 TH
EN GOTO 760
  750 PROCbkey(A)
  760 READA$:VDU5:MOVE A+25
,130:PRINTA$
  770 T(QW)=A
  780 QW=QW+1
  790 MOVE A,80:DRAW A,400
  800 MOVE A+4,80:DRAW A+4,
400
  810 PLOT69,A-4,80:PLOT 69
,A,80:PLOT 69,A+6,80
  820 NEXT A
  830 GCOL 0,3
  840 ENDPROC
  850 :
  860 DEF PROCnote
  870 FOR S=0 TO 18
  880 IF A>T(S) AND A<T(S+1
) THEN so=N(S)
  890 NEXT S
  900 ENDPROC
```

This is one of hundreds of programs now available FREE for downloading on **MicroLink**

→

### From Page 19

```
 910 DEFPROCnotes
 920 RESTORE 990
 930 DIMN(20)
 940 FOR SS=0 TO 18
 950 READ S
 960 N(SS)=S
 970 NEXTSS
 980 ENDPROC
 990 DATA 40,48,52,60,68,7
2,90,88,96,100,108,116,120,
128,136,144,148,156,164
1000 DEF PROCtest
1010 IF joy=TRUE THEN tes=
ADVAL(0) AND 3 ELSE tes=0
1020 IF tes=1 THEN T=TRUE
1030 IF tes=3 THEN T=TRUE
1040 IF joy=FALSE AND INKE
Y(-74) THEN T=TRUE
1050 IF INKEY-52 REC=TRUE
1060 IF INKEY(-100) AND RE
C=TRUE n(TT)=999:TT=TT+1:VD
U4:IF REC=TRUE PRINTTAB(20,
15);"Memory Free: ";250-TT;
"  ":SOUND 1,-15,0,1
1070 IF INKEY-56 REC=FALSE
1080 IF INKEY(-71) THEN PR
OConekey
1090 IF INKEY(-101) THEN P
ROCplaytune
1100 IF INKEY(-83) THEN PR
OCclear
1110 IF INKEY(-90) THEN VD
U4:TT=TT-1:PRINTTAB(20,15);
"Memory Free: "250-TT:SOUND
1,-15,200,2:VDU 5:IF TT<0 T
HEN TT=0:SOUND1,-15,20,2
1120 IF TT<1 THEN TT=1
1130 IF INKEY(-104) THEN R
R=RR+1:PROCpt
1140 IF INKEY(-103) THEN R
R=RR-1:PROCpt
1150 VDU4:IF REC=TRUE THEN
PRINTTAB(2,2);"RECORD MODE
" ELSE PRINTTAB(2,2);"PLA
Y MODE    ":VDU5
1160 VDU5
1170 ENDPROC
1180 DEF PROCplay
1190 VDU4:IF REC=TRUE THEN
PRINTTAB(2,2);"RECORD MODE
" ELSE PRINTTAB(2,2);"PLAY
MODE    "
1200 VDU4:IF REC=TRUE THEN
PRINTTAB(20,15);"Memory Fr
ee: ";250-TT;"   "
1210 IF TT=250 THEN REC=FA
LSE
1220 VDU5
```

```
1230 PROCnote
1240 IF FL=TRUE so=so-4
1250 IF SH=TRUE so=so+4
1260 SOUND&0011,-15,so,10
1270 SH=FALSE:FL=FALSE
1280 IF REC=TRUE n(TT)=so:
TT=TT+1:IF TT=250 REC=FALSE
1290 ENDPROC
1300 DATA A,B,C,D,E,F,G,A,
B,C,D,E,F,G,A,B,C,D,E
1310 :
1320 DEF PROCplaytune
1330 VDU 4:PRINTTAB(2,2);"
PLAYBACK MODE   ":VDU 5
1340 FOR AP=0 TO 251
1350 IF n(AP)=0 GOTO1380
1360 IF n(AP)=999 THEN SOU
ND1,0,0,1:GOTO 1380
1370 SOUND1,-15,n(AP),RR
1380 NEXT AP
1390 VDU 4:PRINTTAB(2,2);"
            ":VDU 5
1400 REM (14 Spaces)
1410 VDU4:IF REC=TRUE THEN
PRINTTAB(2,2);"RECORD MODE
" ELSE PRINTTAB(2,2);"PLAY
MODE     "
1420 VDU 5
1430 ENDPROC
1440 DATA "P...Play","R...
Record"
1450 DATA "<>..Alter Tempo
","K...Key Playback"
1460 DATA "B...Auto Playba
ck"
```

```
1470 DATA "C...Clear Memor
y","DEL.Delete note"
1480 DATA "V...Pause"," ",
" ","If you use keys:","Z=1
eft   X=Right","S=Sharp
F=Flat","  RETURN=Play"
1490 DEF PROCclear
1500 FOR D=0 TO 250
1510 n(D)=0
1520 NEXT D
1530 TT=0
1540 VDU 4
1550 PRINTTAB(20,15);"Memo
ry Free: ";250-TT;"   "
1560 VDU 5
1570 ENDPROC
1580 DEF PROCpt
1590 IF RR<0 RR=0:ENDPROC
1600 IF RR>30 RR=30:ENDPRO
C
1610 VDU4
1620 PRINTTAB(20,17);"Temp
o: ";RR;"   "
1630 VDU 5
1640 ENDPROC
1650 :
1660 DEF PROCbkey(T)
1670 VDU 29,T;400;
1680 GCOL 0,0
1690 MOVE -20,0:MOVE 20,0:
PLOT 85,-20,-200:PLOT 85,20
,-200
1700 GCOL 0,3:PLOT69,-20,-
200:PLOT69,20,-200:GCOL 0,0
1710 VDU 29,0;0;
```

```
1720 ENDPROC
1730 DEF PROCtitle
1740 CLS
1750 PRINT''''"Computer Key
board Player"
1760 PRINT''"BY OLIVER BISH
OP"
1770 PRINT''"With help from
Julian,Philip & Jonathan"
1780 PRINT''"You can use K
eyboard ( K )"
1790 PRINT''"Or Analogue jo
ystick ( J )"
1800 PRINT''"Which?";:A$=GE
T$
1810 ENDPROC
1820 DEFPROConekey
1830 VDU 4:PRINTTAB(2,2);"
ONE KEY PLAY   ":VDU5
1840 FOR AP=0 TO 251
1850 IF n(AP)=000 GOTO1910
1860 IF n(AP)=999 GOTO1910
1870 IF n(AP)=0 THEN GOTO
1910
1880 *FX15,1
1890 REPEAT UNTIL GET=32:*
FX21,5
1900 REPEAT:SOUND1,-15,n(A
P),1:UNTIL INKEY(-99)=FALSE
1910 QQQ=n(AP):NEXT
1920 ENDPROC
```

```
PLAY MODE

P...Play
R...Record
<>..Alter Tempo
K...Key Playback
B...Auto Playback
C...Clear Memory
DEL.Delete note
V...Pause

If you use keys:
Z=left        X=Right
S=Sharp       F=Flat
    RETURN=Play
```

```
COMPUTER
KEYBOARD
PLAYER..

Keyboard

Memory Free: 250
Tempo: 10
```

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**ROYAL WEDDING** Celebrate the royal event with our ingenious sliding block puzzle. **SNAPDRAGON** Two player version of the classic card game. **ATTRIBUTES** Colourful two player strategy game. **FORMATTER** Make your listings easier to read. **DISCS** Extended star commands. **EXTRA COMMANDS** A WHILE ... WEND command for your micro. **PLUS** superb digitised picture of Andrew and Sarah.

### June 1986
**FISHING** Enjoy a quite day by the river, and maybe catch your tea as well! **TACTICAL PURSUIT** A two player strategy game played with pawns on a chess board. **MINIBASE** Create an electronic telephone directory. **EXTRA COMMANDS** Add more commands to Basic. **SCREEN DUMP** Multi-tone

screens dumps for Epson compatible printers.

### May 1986
**MISSILE JAMMER** Defend the city of Pezina from a missile invasion. **VECTOR LETTERS** Use *LINE to create double height text. **DEGREES** Convert from Centigrade to Fahrenheit and vice-versa. **CROCODILE TEARS** Spell well or end up as a crocodile's dinner. **ZAP** Blast the marauding aliens. **EXTRA COMMANDS** Adding new keywords to Basic.

### April 1986
**INVASION FORCE** Exciting zap 'em space game. **EASTER EGG HUNT** Seasonal game using compass points. **BACH TO BASICS** Music tutor. **NOTICE BOARD** Text scrolling utility. **SEARCH and RECOVER** Two routines from the disc article. **NOTEBOOK** Recursion backwards.

### March 1986
**GRAND PRIX** Exciting race game. **DICER** A clever test of strategy. **MARCHING ORDER** Counting and ordering numbers. **FIND AND REPLACE** Useful editing program. **SECTOR EDITOR** Excellent disc utility. **TIMEPIECE** Superb graphics demonstration. **OXO** Game of cunning. **TRICIRC** A circle of triangles.

### February 1986
**NECROMANCER** Superb text adventure. **GREBIT** Arcade action. **FAST BACKUP** Disc utility. **MACHINE CODE** How to write an arcade game. **TAPEDISC** More software transferring techniques. **SIDEWAYS RAM** Example program.

### January 1986
**FRUIT WORM** An arcade classic. **HELICOPTER RESCUE** Pilot an air sea rescue helicopter. **MACHINE CODE** Detect collisions between sprites. **TAPEDISC** Transfer your software to disc. **MODE012** Multi-Mode screens.

# CARPET

BY ROG FROST

WE all know that the graphic capabilities of the Electron are superb. In this program these facilities are used to produce square patterns which end up looking like fireside rugs.

These effects are produced by moving into undocumented areas of Basic. The Electron User Guide lists GCOL 0 to GCOL 4, but it would be beyond the Acorn boffins to leave it at that.

In fact there are 256 different versions of GCOL, most of which produce vertical stripes.

These stripes are added on to the existing colours in numerous different ways and intricate patterns can be created.

In Carpet the computer is the main artist but you make some decisions. Firstly you can select any graphics mode and then choose the colours.

After that the Electron is away, but you can stop it at any time and invert all the colours before giving the computer its head again. The program contains full instructions.

## MAIN VARIABLES

| | |
|---|---|
| A% | Used to select colour and GCOL. |
| C% | Number of colours available. |
| D%( ) | Actual colours chosen. |
| M% | Mode selected. |
| R% | Size of current square. |

```
   10 REM Carpet
   20 REM By Rog Frost
   30 REM (c) Electron User
   40 ON ERROR IF ERR()17 M
ODE6:REPORT:PRINT" at line
 ";ERL:END
   50 CLEAR
   60 MODE6:VDU19,0,4;0;23;
8202;0;0;0;
   70 PROCinstruct
   80 PROCselect
   90 MODEM%:VDU23;8202;0;0
;0;
  100 FORN%=1TOC%:VDU19,N%,
D%(N%);0;:NEXT
  110 IF M%=2 FORN%=8TO15:V
DU19,N%,D%(N%-8);0;:NEXT
  120 CLS
  130 VDU29,638;508;
  140 REPEAT:Q%=RND(127)
  150 R%=510
  160 MOVE0,0
  170 FORA%=1TO127STEP2
  180 GCOLA%+Q%,A%DIV2
  190 MOVE0,R%:MOVE0,0:PLOT
85,R%,0:PLOT85,0,-R%:MOVE0,
0:PLOT85,-R%,0:PLOT85,0,R%
  200 IF INKEY(-99)PROCpaus
e
  210 R%=R%-8
  220 NEXT
  230 UNTIL 1=2
  240 DEFPROCpause
  250 REPEAT
  260 IF INKEY(-74) GCOL4,1
28:CLG
  270 UNTILINKEY(-1)
  280 ENDPROC
  290 DEFPROCinstruct
  300 VDU28,1,24,39,0
  310 PRINTTAB(13,2)"C A R
P E T"TAB(13,3)"************
"
  320 PRINT''"This program
will design a carpet"'"in t
wo, four or eight colours."
  330 PRINT''"At any time y
ou can hit space to"'"stop
the drawing."
  340 PRINT''"Return then i
nverts all colours."
  350 PRINT''"Press shift t
o restart the action."
  360 REPEAT:INPUT''"Which
Mode (0,1,2,4,5)",M%:UNTILM
%)-1 AND M%<6:IF M%=3 THEN3
60
  370 CLS
  380 ENDPROC
  390 DEFPROCselect
  400 PRINT''"Colours are:-
"
  410 PRINT''"0...black"''"1.
..red"''"2...green"''"3...yel
low"''"4...blue"''"5...magent
a"''"6...cyan"''"7...white"
  420 FORN%=0TOM%:READC%:NE
XT
  430 DATA2,4,8,0,2,4
  440 DIM D%(C%)
  450 PRINT''"You have chose
n MODE ";M%;" and can"''"sel
ect ";C%;" colours."
  460 VDU28,1,24,39,18
  470 FORN%=1TOC%:PRINT"Se
lect number for colour ";N%
:IF N%=C%PRINT" (BACKGROUND
)";
  480 INPUT D%(N%):NEXT
  490 ENDPROC
```

*This listing is included in this month's cassette tape offer. See order form on Page 53.*

# Learning CAN be fun

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### Ages 2-5

Alphabet
Colours
Counting
House
Magic Garden
Matchmaker
Numbers
Pelican
Seaside
Snap

**PELICAN**
*Teach your children to cross the road safely at a Pelican crossing*

**HOUSE**
*Select the colours to draw a house – hours of creative entertainment*

### Ages 5-8

Balance
Castle
Derrick
Fred's Words
Hilo
Maths Test
Mouser
Number Signs
Seawall
Super Spell

**NUMBER SIGNS**
*Provide the correct arithmetic sign and aim to score ten out of ten*

**BALANCE**
*Learn maths the fun way. Type in the answer to balance the scales*

### Ages 8-12

Anagram
Codebreaker
Dog Duck Corn
Guessing
Hangman
Maths Hike
Nim
Odd Man Out
Pelmanism
Towers of Hanoi

**HANGMAN**
*Improve your child's spelling with this fun version of the popular game*

**ODD MAN OUT**
*Find the word that does not fit – before your time runs out*

## *TO ORDER TURN TO THE FORM ON PAGE 53*

# The PLOT: Draw without DRAWing!

## Part 12 of the Electron graphics series by TREVOR ROBERTS

LAST month I left you with a mandala to muck about with and reinforce what you've learnt about coordinates and the graphics commands DRAW and MOVE.

Now we'll look at another graphics command, one that allows you to draw without a DRAW.

First put the Electron into a four colour mode with:

```
MODE 1
```

And now draw a line to (roughly) the centre of the screen with:

```
DRAW 500,500
```

By now you should be thoroughly familiar with the idea that the DRAW command moves the invisible graphics cursor from wherever it was to the point whose coordinates follow the DRAW. On the way the graphics cursor draws a line.

Since we'd just entered Mode 1, the cursor was at the bottom left of the screen, the origin. This has coordinates 0,0. After the:

```
DRAW 500,500
```

the cursor is now at the point 500,500 and any subsequent DRAWs will

take this as the start of the line.

Now let's go back to the original conditions and draw the same line. Only this time we won't be using DRAW.

Again, put the micro back into Mode 1 with:

```
MODE 1
```

and we're back where we started. The screen is clear and the cursor is positioned

at 0,0. Try:

```
PLOT 5,500,500
```

and see what happens. The result is exactly the same as with:

```
DRAW 500,500
```

So what is this PLOT all about?

In essence, it is a Basic command which controls what can be drawn on the graphics screen and how it is drawn.

As we'll see, it can do all sorts of interesting things, one of which is to get the Electron to draw a line.

The format for the PLOT command is:

```
PLOT code,xCoordinate,yCoordinate
```

The *xCoordinate* and *yCoordinate* values are just the same as the two coordinate values that we've previously used with MOVE and DRAW.

The *code* parameter is something else entirely, adding to the PLOT. In fact what the PLOT command actually achieves depends entirely on the value of *code*.

In our earlier example

*code* had the value 5. This tells the Electron to draw a line from wherever the graphics cursor is when the command is issued to the point with coordinates *xCoordinate,yCoordinate*.

Since these are both 500 and the cursor starts off at 0,0 a line is drawn (or plotted) from 0,0 to 500,500.

So PLOT with a *code* of 5 is exactly the same as DRAW. Try a few PLOT 5s with other coordinate values to convince yourself of this.

Inquiring minds may wonder if there's a PLOT equivalent to MOVE. There is. It's when PLOT has a *code* of 4.

To demonstrate this, recreate our original line with:

```
MODE 1
PLOT 5,500,500
```

or:

```
MODE 1
DRAW 500,500
```

if you want to be old-fashioned.

Whichever way you go about it, the graphics cursor is now lurking invisibly at 500,500.
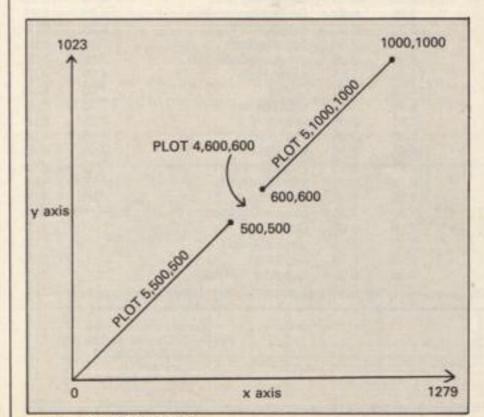
It's probably getting



Figure 1: PLOT in action

# Graphics

## From Page 27

bored so give it something to do with:

```
PLOT 4,600,600
```

and you'll see nothing happen. In fact what has happened is that the Electron has obeyed the PLOT 4 and moved the graphics cursor to 600,600 without leaving a line behind it.

We could have used:

```
MOVE 600,600
```

to do the same job but as we're trying to unravel the PLOT command it would have been a bit daft!

Mind you, I say that the graphics cursor is at 600,600, but since it's invisible it could be anywhere, couldn't it?

So let's just indicate where it is (or was, after the command) using:

```
PLOT 5,1000,1000
```

which, you will see, draws a line from 600,600 to 1000,1000.

The more pedestrian may use:

```
DRAW 1000,1000
```

for the same purpose but be warned. Soon PLOT will be doing things that MOVE and DRAW can't, so you might as well get used to it.

By this time you should

```
10 REM Program I
20 MODE 1
30 FOR loop=1 TO 20
40 DRAW RND(1000),RND(10
00)
50 MOVE 0,0
60 NEXT loop
```
Program I

have a line across the screen with a little gap in it. Figure I shows the PLOTs behind the story so far.

Can you use the PLOT command to fill in the gap? It isn't hard. The answer is:

```
PLOT 4,500,500
PLOT 5,600,600
```

or:

```
PLOT 4,600,600
PLOT 5,500,500
```

where PLOT 4 is equivalent

```
10 REM Program II
20 MODE 1
30 FOR loop=1 TO 20
40 PLOT 5,RND(1000),RND(
1000)
50 PLOT 4,0,0
60 NEXT loop
```
Program II

to MOVE and PLOT 5 equates to DRAW.

Notice that although both the above answers fill in the gap, they're not the same.

There's a subtle but important difference between them. Can you see it?

Well literally, no you can't, as it involves the invisible graphics cursor.

Ask yourself where it ends up after each PLOT 5.

And when you've figured that out, have a look at Programs I and II. Although they use different keywords, they do the same thing, as you'll find when you run them. If you're feeling adventurous, try other values for the *code* parameter in Program II.

● *That's what we'll be doing next month as relatives get involved in the PLOTting.*

---

# Your ADC likes a bit of electrical peace and quiet

## Part II of the Plus 1 series
## by JOE PRITCHARD

LAST month we looked at the basic concepts and ideas behind analogue to digital converters. This month we'll look at the Plus 1's analogue port in particular and examine its possibilities and limitations. In addition, we'll see how Basic's ADVAL function is used to read the port.

Figure I shows the analogue socket seen as it appears when looking at the back of the Plus 1.

Such a diagram is often called a pin out because it shows how the "pins" of the Analogue to Digital Converter (ADC) chip in the Plus 1 are taken to the outside world.

The connector used for the analogue input is a 15-pin socket referred to as a D-type, (you only have to look at it to see why) which receives a 15-way D plug.

Now let's look at what each of the pins does. Rather than just go through the pins from 1 to 15, I've grouped them according to their function.

Pin 1 is the +5 volt line which can be used to power things that are plugged into the analogue port.

However, it can't supply much current, so don't do silly things like connecting it to a 0V pin.

For those of you who might be tempted to try, this would result in a short circuit, the 5V supply being asked to supply a very large current. It can't do this so the Plus 1 could be damaged.

Pins 2 and 3 are the 0 volt lines. This pair, plus the 5 volt line are taken from the digital circuitry inside the Electron and Plus 1.

These two pins are often called the digital ground pins, ground being the term used in electronics to refer to a wire or connection which is at 0V.

Pins 5 and 8 are more 0V lines and are called analogue ground lines.

Why do we have two different sets of 0V pins available? Well, it's all to do with electrical noise.

Just think of noise in electrical circuits as being similar to static on the radio, or the interference that you sometimes get on television when a car goes past.

When logic signals go round a computer circuit they can generate some of this noise in electrical circuits to which they are connected or any circuit that is close by.

The digital ground lines are particularly susceptible to this specific form of noise and although the voltages involved are not big enough to cause any problems to the digital circuits, they can cause difficulties with analogue signals.

The voltage input to an ADC is always via two wires, one of these being a 0V line. The ADC effectively converts the voltage difference between the signal wire (which carries the voltage from the transducer in use) and the 0V line, into a digital output for the computer to read.

Therefore if the line used has a small changing voltage on it the difference between the signal voltage and the 0V line will also change, causing a variation in the digital output.
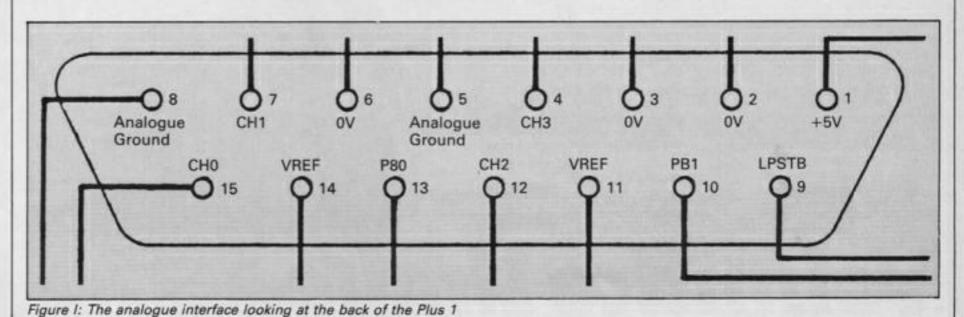
To reduce these alterations in input voltage to the ADC, the analogue ground is supposed to be electrically quiet with little or no noise on it.

The noise on any ground used gives rise to something called jitter on the output of the ADC – the value returned alters slightly when there is a constant voltage input.

The practical result of all this is that we should always input our signals via the analogue ground if we have the chance.

Pins 11 and 14 carry a voltage of 1.8V. This is intended to be used as a



Figure I: The analogue interface looking at the back of the Plus 1

# Hardware projects

## From Page 29

reference voltage; an input of 1.8V to the analogue interface will cause a maximum value to be output by the ADC.

You shouldn't try powering an electrical circuit from this signal, known as VREF (Voltage REFerence), as it can't supply enough current to be of use.

If you do intend to use it, as we will do later in the series, it should be used to supply voltage to a circuit that has an impedance of at least 10,000 ohms. Such circuits usually take the full VREF and return a fraction of it to an ADC input channel depending on the size of the physical parameter being measured.

Pins 10 and 13 are digital inputs and are typically used to connect the joystick fire buttons to the computer. There'll be more on their use later in the series.

Now let's take a brief look at how Basic reads the analogue port.

The Plus 1 can have 4 input voltages connected to it – channels 0 to 3 – as follows:

    Channel 0   Pin 15
    Channel 1   Pin 7
    Channel 2   Pin 12
    Channel 3   Pin 4

The ADC converts each of these inputs in turn, taking 10mS each. Under normal circumstances therefore, a given channel is converted once every 40mS.

Each channel can be read from software using Basic's ADVAL(n) function where *n* is the channel number. Just to confuse matters here, Basic sees the channels as being numbered 1 to 4.

When building any hardware project which uses the analogue port always remember:

● Don't connect the inputs to any voltage above 1.8 volts.

● Don't connect the inputs to any voltage less than 0 volts.

● Never bring mains voltages anywhere near the ADC input.

Failure to observe these conditions may cause damage to the Plus 1.

The first statement is clear enough; the ADC is reputed to be able to take up to 5V input without damage – don't risk it though.

There are no advantages in using such high input voltages. For many experiments VREF will provide the voltages needed.

The second condition needs a little thought. "Less than 0 volts" simply means a negative voltage at the input relative to that on the analogue ground line.

The simplest way to damage your Plus 1 would be to take a battery and connect the positive terminal to 0V and the negative to the input pin of one of the channels.

The third statement should be very obvious – this would damage the Plus 1, the Electron and you!

● *That's it for now. Next month we get to the part you've all been waiting for – actually plugging something in to the analogue port. We'll build a couple of circuits so that we can cut our teeth on some simple analogue interfacing.* ■

# Barney's bugbear in the creepy castle

## By Martin Cottle

BARNEY the bear has accidentally locked himself inside a maze of dungeons while exploring Baron Von Klink's creepy castle.

Fortunately there is a way out but he needs your help. There are several golden keys scattered throughout the 16 rooms and if you can help Barney collect them he can unlock the outer door to the maze.

The dungeons are inhabited by many ghosts and ghouls and these will try to frighten Barney to death.

Luckily he has his water pistol with him and these fiendish monsters hate water. A quick blast and they soon disappear!

Your task is to guide Barney through the maze collecting all the keys and return him safely to the start. The final door will then open allowing him to escape from the creepy castle.

## PROCEDURES

| | |
|---|---|
| main | Main program loop. |
| fire | Fire pistol. |
| screen | Draw the room. |
| doors | Open or close the doors. |
| end | Print the high score table. |
| asmb | Assemble the machine code. |
| setup | Define the graphics. |

## VARIABLES

| | |
|---|---|
| HI% | High score. |
| A%,B% | Barney's coordinates. |
| d% | Direction Barney is facing. |
| key% | Number of keys collected. |
| L% | Number of lives left. |
| MAN$() | Barney's characters. |

## CONTROLS

| | |
|---|---|
| Z | = Left |
| X | = Right |
| * | = Up |
| ? | = Down |
| Space | = Fire |

## From Page 33

```
10 REM ------ Maze -----
20 REM  By Martin Cottle
30 REM (c) Electron User
40 REM -----------------
50 ONERROR IF ERR=17 GOT
O80 ELSE MODE6:PRINT''':REP
ORT:PRINT" at line ";ERL:EN
D
60 DIM MAN$(2,2),key(16)
:H$="MARTIN":HI%=100
70 MODE6:PROCasmb:PROCse
tup
80 MODE4:PROCinst
90 MODE5:VDU23;8202;0;0;
0;19,3,6;0;
100 REPEAT
110 PROCinit
120 PROCscreen:PROCmain
130 PROCend
140 UNTILFALSE
150 DEFPROCmain
160 REPEAT:CALLkeys:a%=A%
:b%=B%:ON?dir GOSUB 250,260
,270,280 ELSEGOTO190
170 ?&70=A%:?&71=B%:CALLc
heck:IF?scr=32 THEN 180 ELS
E IF?scr=128 PROCcollect EL
SE IF?scr=0 THEN PROCmb ELS
E IF?scr=129 ?medead%=1
180 ?&70=A%:?&71=B%+1:CAL
Lcheck:IF?scr=32 THEN 190 E
LSE IF?scr=128 PROCcollect
ELSE IF?scr=0 THEN PROCmb E
LSE IF?scr=129 ?medead%=1
190 PROCnewscreen:COLOUR1
:PRINTTAB(a%,b%);SP$;TAB(A%
,B%);MAN$(d%,p%)::CALLalien
s:?random%=RND(4):?(&920+RN
D(15))=RND(4):IF?medead%=1
PROCdead
200 IFINKEY-99 AND ?dir<3
PROCfire
210 UNTILL%=0
220 *FX21,0
230 ENDPROC
240 DEFPROCmb:ON?dir GOSU
B 260,250,280,270:?dir=0:EN
DPROC
250 A%=A%-1:IFM%=1 d%=2:p
%=1:M%=2:RETURN ELSE d%=2:p
%=2:M%=1:RETURN
260 A%=A%+1:IFM%=1 d%=1:p
%=1:M%=2:RETURN ELSE d%=1:p
%=2:M%=1:RETURN
```

```
270 B%=B%-1:IFM%=1 p%=1:M
%=2:RETURN ELSE p%=2:M%=1:R
ETURN
280 B%=B%+1:IFM%=1 p%=1:M
%=2:RETURN ELSE p%=2:M%=1:R
ETURN
290 DEFPROCcollect:VDU31,
?&70,?&71,32:key%=key%+1:VD
U17,3,31,16,21:PRINT;key%;"
";:FORI%=200TO203:SOUND1,-
15,I%,1:NEXT:key(room%)=0:S
%=S%+10:VDU17,2,31,16,12:PR
INT;S%;;:ENDPROC
300 DEFPROCfire:IFd%=1 GO
TO340
310 IFA%<=2 ENDPROC
320 SOUND1,1,60,5:D%=B%+1
:I%=A%-1:REPEAT:?&70=I%:?&7
1=D%:CALLcheck:IF?scr<>32 P
ROCchscr:I%=2 ELSE VDU31,I%
,D%,130:PROCpause(1):VDU31,
I%,D%,32
330 I%=I%-1:UNTILI%<2:END
PROC
340 IFA%>=13 ENDPROC
350 SOUND1,1,60,5:D%=B%+1
:I%=A%+1:REPEAT:?&70=I%:?&7
1=D%:CALLcheck:IF?scr<>32 P
ROCchscr:I%=13 ELSE VDU31,I
%,D%,130:PROCpause(1):VDU31
,I%,D%,32
360 I%=I%+1:UNTILI%>13:EN
DPROC
370 DEFPROCchscr:IF?scr=1
29 PROCloop
380 IF?scr=128 VDU31,I%,D
%,128:ENDPROC ELSE VDU31,I%
,D%,32:ENDPROC
390 DEFPROCloop:Q%=0:REPE
AT:IF I%=?(ax%+Q%) AND D%=?
(ay%+Q%) AND ?(adead%+Q%)=0
THEN ?(adead%+Q%)=1:SOUND0
,-15,6,4:S%=S%+10:COLOUR2:P
RINTTAB(16,12);S%;:need%=ne
ed%-1:VDU31,I%,D%,140
400 Q%=Q%+1:UNTILQ%=16:EN
DPROC
410 DEFPROCpause(p):TIME=
0:REPEATUNTILTIME>p:ENDPROC
420 DEFPROCnewscreen:fin%
=0:IFroom%=16 PROCchexit:EN
DPROC
430 IFneed%=0 AND done%=0
PROCdoors:done%=1 ELSE IFd
one%=0 ENDPROC
440 IFA%>14 room%=room%+1
```

```
:A%=2:a%=2:fin%=1 ELSE IFA%
<2 room%=room%-1:A%=13:a%=1
3:fin%=1
450 IFB%<2 room%=room%-4:
B%=26:b%=26:fin%=1 ELSE IFB
%>27 room%=room%+4:B%=5:b%=
5:fin%=1
460 IFfin%=1 fin%=0:PROCs
creen
470 ENDPROC
480 DEFPROCchexit
490 IFneed%=0 AND done%=0
AND key%<>16 PROCldoor:don
```

```
e%=1 ELSE IFneed%=0 AND key
%=16 AND done%=0 PROCdoors:
done%=1
500 IF A%>14 PROCreset:PR
OCscreen:ENDPROC ELSE IFA%<
2 room%=room%-1:A%=13:fin%=
1
510 IFfin%=1 fin%=0:PROCs
creen
520 ENDPROC
530 DEFPROCreset:VDU28,0,
31,15,0,12,26
540 PROCdh(3,3,"WELL DONE
!",1,2):PROCdh(0,8,"You esc
aped from",3,2):PROCdh(0,12
,"the maze,but can",3,2):PR
OCdh(0,16,"you do it again?
",3,2):PROCdh(0,21,"BONUS:"
,2,1)
550 RESTORE560:FORI%=0TO2
1:READP,D:SOUND1,-15,P,D/2:
SOUND1,0,0,0:NEXTI%
560 DATA101,10,109,10,117
,10,121,20,101,20,121,10,11
7,10,121,10,129,20,109,20,1
09,10,117,10,121,10,137,10,
129,10,129,10,121,10,121,10
,117,10,109,10,117,10,101,4
0
570 PROCpause(200)
580 COLOUR3:PRINTTAB(6,22
)"100":oldS%=S%:REPEAT:S%=S
%+10:PRINTTAB(16,12);S%;:SO
UND1,-15,S%DIV10,2:PRINTTAB
(6,22);100-(S%-oldS%);" ";:
```

```
PROCpause(25):UNTILS%=oldS%
+100
590 IFL%<5 L%=L%+1:PRINTT
AB(15+L%-1,29);MAN$(1,2);:S
OUND1,1,60,2
600 PROCdh(2,26,"PRESS SP
ACE",1,2):PROCdh(2,28,"TO C
ONTINUE",1,2)
610 *FX21,0
620 REPEATUNTILGET=32
630 room%=16:?aliens%=?al
iens%+2:need%=?aliens%:A%=2
:B%=5:key%=-1:PROCcollect:I
F?aliens%>16 ?aliens%=16
640 FORI%=1TO16:key(I%)=1
:NEXT:SOUND1,-15,41,2:SOUND
1,-15,69,6:SOUND1,-15,41,2:
SOUND1,-15,69,10
650 ENDPROC
660 DEFPROCscreen
670 VDU28,0,31,15,0,12,26
680 GCOL0,3:ON room% GOSU
B 730,740,730,750,760,770,7
80,740,790,800,810,770,820,
830,790,840
690 PROCdoors
700 M%=2:COLOUR1:PRINTTAB
(A%,B%);MAN$(d%,p%)::PROCal
iens:?dir=0:need%=?aliens%:
done%=0
710 IFkey(room%)=1 REPEAT
:?&70=RND(12)+1:?&71=RND(19
)+6:CALLcheck:UNTIL?scr=32:
VDU31,?&70,?&71,128
720 ENDPROC
730 PROC1:PROC2:PROC3:PRO
C4:VDU23,129,40,16,84,56,25
4,56,84,0:RETURN
740 PROC5:PROC6:PROC7:PRO
C8:VDU23,129,36,24,60,90,15
4,165,195,0:RETURN
750 PROC5:PROC6:PROC9:PRO
C10:VDU23,129,129,66,36,24,
24,60,66,129:RETURN
760 PROC11:PROC12:PROC3:P
ROC8:VDU23,129,129,66,36,90
,189,90,255,153:RETURN
770 PROC11:PROC12:PROC14:
PROC10:VDU23,129,129,90,60,
90,126,60,90,129:RETURN
780 PROC11:PROC15:PROC3:P
ROC4:VDU23,129,126,255,219,
255,102,60,102,195:RETURN
790 PROC11:PROC15:PROC14:
PROC17:VDU23,129,60,66,165,
165,153,255,66,60:RETURN
```

```
800 PROC5:PROC2:PROC7:PRO
C4:VDU23,129,24,60,126,165,
153,126,60,24:RETURN
810 PROC16:PROC12:PROC7:P
ROC8:VDU23,129,60,126,219,2
55,195,219,126,60:RETURN
820 PROC1:PROC2:PROC14:PR
OC17:VDU23,129,20,28,62,107
,62,28,42,73:RETURN
830 PROC16:PROC12:PROC9:P
ROC10:VDU23,129,60,66,165,1
29,165,153,66,60:RETURN
840 PROC5:PROC2:PROC9:PRO
C17:VDU23,129,60,126,255,15
3,219,255,255,219:RETURN
850 DEFPROC1:MOVE0,499:DR
AW0,999:DRAW499,999:MOVE123
,499:DRAW123,876:DRAW499,87
6:MOVE0,999:DRAW123,876:END
PROC
860 DEFPROC2:MOVE507,999:
DRAW1019,999:DRAW1019,593:D
RAW896,569:DRAW896,876:DRAW
507,876:MOVE1019,999:DRAW89
6,876:ENDPROC
870 DEFPROC3:MOVE0,0:DRAW
377,0:DRAW409,123:DRAW123,1
23:DRAW0,0:DRAW0,499:MOVE12
3,123:DRAW123,499:ENDPROC
880 DEFPROC4:MOVE896,123:
DRAW609,123:DRAW641,0:DRAW1
019,0:DRAW1019,425:DRAW896,
449:DRAW896,123:DRAW1019,0:
ENDPROC
890 DEFPROC5:MOVE123,876:
DRAW123,569:DRAW0,593:DRAW0
,999:DRAW123,876:DRAW499,87
6:MOVE499,999:DRAW0,999:END
PROC
900 DEFPROC6:MOVE507,999:
DRAW1019,999:DRAW1019,499:M
OVE896,499:DRAW896,876:DRAW
507,876:MOVE1019,999:DRAW89
6,876:ENDPROC
910 DEFPROC7:MOVE0,0:DRAW
377,0:DRAW409,123:DRAW123,1
23:DRAW123,449:DRAW0,425:DR
AW0,0:DRAW123,123:ENDPROC
920 DEFPROC8:MOVE896,123:
DRAW609,123:DRAW641,0:DRAW1
019,0:DRAW1019,499:MOVE896,
499:DRAW896,123:DRAW1019,0:
ENDPROC
930 DEFPROC9:MOVE0,0:DRAW
0,425:DRAW123,449:DRAW123,1
23:DRAW0,0:DRAW499,0:MOVE12
3,123:DRAW499,123:ENDPROC
940 DEFPROC10:MOVE507,123
:DRAW896,123:DRAW896,499:MO
VE507,0:DRAW1019,0:DRAW1019
,499:MOVE1019,0:DRAW896,123
:ENDPROC
950 DEFPROC11:MOVE0,499:D
RAW0,999:DRAW377,999:DRAW40
9,876:DRAW123,876:DRAW123,4
99:MOVE0,999:DRAW123,876:EN
DPROC
960 DEFPROC12:MOVE896,876
:DRAW609,876:DRAW641,999:DR
AW1019,999:DRAW896,876:DRAW
896,499:MOVE1019,999:DRAW10
19,499:ENDPROC
970 DEFPROC14:MOVE0,499:D
RAW0,0:DRAW499,0:MOVE499,12
3:DRAW123,123:DRAW123,499:M
OVE0,0:DRAW123,123:ENDPROC
980 DEFPROC15:MOVE896,876
:DRAW896,569:DRAW1019,593:D
RAW1019,999:DRAW896,876:DRA
W609,876:DRAW641,999:DRAW10
19,999:ENDPROC
990 DEFPROC16:MOVE123,876
:DRAW123,569:DRAW0,593:DRAW
0,999:DRAW377,999:DRAW409,8
76:DRAW123,876:DRAW0,999:EN
DPROC
1000 DEFPROC17:MOVE507,0:D
RAW1019,0:DRAW1019,425:DRAW
MOVE385,0:DRAW417,123:DRAW6
896,449:DRAW896,123:DRAW507
,123:MOVE1019,0:DRAW896,123
:ENDPROC
1010 DEFPROC1door:GCOL3,1:
MOVE0,429:DRAW0,589:DRAW123
,565:DRAW123,453:DRAW0,429:
MOVE123,481:DRAW0,470:MOVE1
23,509:DRAW0,509:MOVE123,53
7:DRAW0,547:GCOL3,2:VDU5:MO
VE48,478:VDU141,4:ENDPROC
1020 DEFPROCrdoor:GCOL3,1:
MOVE896,453:DRAW896,565:DRA
W1019,589:DRAW1019,429:DRAW
896,453:MOVE896,481:DRAW101
9,470:MOVE896,509:DRAW1019,
509:MOVE896,537:DRAW1019,54
7:GCOL3,2:VDU5:MOVE930,568:
VDU141,4:ENDPROC
1030 DEFPROCudoor:GCOL3,1:
MOVE385,999:DRAW633,999:DRA
W601,876:DRAW417,876:DRAW38
5,999:MOVE463,876:DRAW439,9
99:MOVE509,876:DRAW509,999:
MOVE555,876:DRAW579,999:GCO
L3,2:VDU5:MOVE401,932:VDU14
1,4:ENDPROC
1040 DEFPROCddoor:GCOL3,1:
01,123:DRAW633,0:DRAW385,0:
MOVE463,123:DRAW439,0:MOVE5
09,123:DRAW509,0:MOVE555,12
3:DRAW579,0:GCOL3,2:VDU5:MO
VE561,80:VDU141,4:ENDPROC
1050 DEFPROCdoors:ONroom%
GOSUB1070,1080,1070,1090,11
00,1110,1120,1080,1130,1140
,1150,1110,1160,1170,1130,1
180
1060 ENDPROC
1070 PROCddoor:PROCrdoor:R
ETURN
1080 PROCddoor:PROCldoor:R
ETURN
1090 PROCldoor:RETURN
1100 PROCudoor:PROCddoor:R
ETURN
1110 PROCudoor:RETURN
1120 PROCudoor:PROCddoor:P
ROCrdoor:RETURN
1130 PROCudoor:PROCrdoor:R
ETURN
1140 PROCddoor:PROCldoor:P
ROCrdoor:RETURN
1150 PROCudoor:PROCddoor:P
ROCldoor:RETURN
1160 PROCrdoor:RETURN
1170 PROCudoor:PROCldoor:R
ETURN
1180 PROCldoor:PROCrdoor:R
ETURN
1190 DEFPROCdead:COLOUR3:P
RINTTAB(A%,B%);DEAD$;:FORI%
=1TO25:VDU19,0,1;0;:SOUND0,
-15,4,1:VDU19,0,0;0;:NEXT:P
RINTTAB(A%,B%);SP$;
1200 L%=L%-1:PRINTTAB(15+L
%,29);SP$;:A%=2:B%=5:PROCsc
reen:?medead%=0:ENDPROC
1210 DEFPROCinit
1220 ?scr=0:?dir=0:?aliens
%=5:?medead%=0
1230 PROCdh(16,3,"MAZE",2,
3):PROCdh(16,9,CHR$131+CHR$
132+CHR$133+CHR$134,1,2):PR
INTTAB(16,12);"0";:PROCdh(1
6,18,"KEYS",2,1):PRINTTAB(1
6,21)"0";:PROCdh(16,26,"MEN
:",2,3)
1240 FORI%=16TO19:COLOUR1:
PRINTTAB(I%,29);MAN$(1,2);:
NEXT
1250 d%=1:p%=2:fin%=0:room
%=16:A%=2:B%=5:L%=5:M%=1:S%
=0:FORI%=1TO16:key(I%)=1:NE
XT:key%=0
1260 SOUND1,-15,41,2:SOUND
1,-15,69,6:SOUND1,-15,41,2:
SOUND1,-15,69,10
```
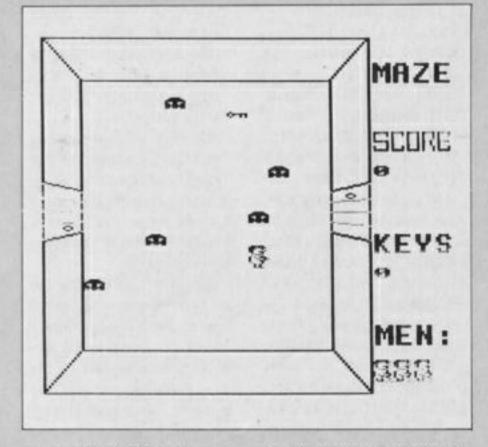
### From Page 35

```
1270 ENDPROC
1280 DEFPROCsetup
1290 ENVELOPE1,129,-15,-8,
-3,10,10,10,126,0,0,-126,12
6,126
1300 VDU23,128,0,0,64,191,
165,69,0,0
1310 VDU23,129,129,90,60,9
0,126,60,90,129
1320 VDU23,130,24,24,0,0,0
,0,0,0
1330 VDU23,131,126,66,64,1
26,2,66,126,0
1340 VDU23,132,251,138,130
,130,130,138,251,0
1350 VDU23,133,239,40,40,4
7,41,40,232,0
1360 VDU23,134,190,162,160
,62,32,162,190,0
1370 VDU23,135,56,124,84,8
4,124,40,40,56,23,136,146,1
98,188,48,24,108,198,130:DE
ADS$=CHR$135+CHR$8+CHR$10+CH
R$136
1380 VDU23,140,137,86,33,2
02,37,72,145,37
1390 VDU23,141,0,0,24,36,3
6,24,0,0
1400 VDU23,151,124,254,228
,194,204,68,56,68,23,152,17
4,147,142,132,68,40,40,60:M
AN$(1,1)=CHR$151+CHR$8+CHR$
10+CHR$152
1410 VDU23,153,132,142,163
,158,132,82,120,247:MAN$(1,
2)=CHR$151+CHR$8+CHR$10+CHR
$153
1420 VDU23,154,62,127,35,6
7,51,34,28,34,23,155,117,20
1,113,33,34,20,20,60:MAN$(2
,1)=CHR$154+CHR$8+CHR$10+CH
R$155
1430 VDU23,156,33,113,197,
121,33,74,85,239:MAN$(2,2)=
CHR$154+CHR$8+CHR$10+CHR$15
6
1440 SP$=CHR$32+CHR$8+CHR$
10+CHR$32
1450 ENDPROC
1460 DEFPROCasmb:scr=&72:d
ir=&73:aliens%=&74:xstore%=
&75:col1%=&76:col2%=&77:med
ead%=&78:random%=&79:ax%=&9
00:ay%=&910:adir%=&920:adea
```

```
d%=&930:os=&FFEE
1470 FORpass=0TO2STEP2:P%=
&5200
1480 [OPTpass
1490 .dh STA&80:STX&89:STY
&8A:LDA#10:LDX#&80:LDY#0:JS
R&FFF1
1500 LDA#23:JSRos:LDA#255:
JSRos:LDA&81:JSRos:JSRos:LD
A&82:JSRos:JSRos:LDA&83:JSR
os:JSRos:LDA&84:JSRos:JSRos
:LDA#17:JSRos:LDAcol1%:JSRo
s:LDA#31:JSRos:LDA&89:JSRos
:LDA&8A:JSRos:LDA#255:JSRos
:LDA&8A:JSRos:LDA#255:JSRos
1510 LDA#23:JSRos:LDA#255:
JSRos:LDA&85:JSRos:JSRos:LD
A&86:JSRos:JSRos:LDA&87:JSR
os:JSRos:LDA&88:JSRos:JSRos
:LDA#17:JSRos:LDAcol2%:JSRo
s:LDA#31:JSRos:LDA&89:JSRos
:LDA&8A:ADC#1:JSRos:LDA#255
:JSRos:RTS
1520 .inkey LDY#&FF:LDA#&8
1:JSR&FFF4:TXA:RTS
1530 .keys LDX#&9E:JSRinke
y:BEQnleft:LDA#1:STAdir
1540 .nleft LDX#&BD:JSRink
ey:BEQnright:LDA#2:STAdir
1550 .nright LDX#&B7:JSRin
key:BEQnup:LDA#3:STAdir
1560 .nup LDX#&97:JSRinkey
:BEQndown:LDA#4:STAdir
1570 .ndown RTS
1580 .check LDA#31:JSRos:L
DA&70:JSRos:LDA&71:JSRos:LD
A#135:JSR&FFF4:STXscr:RTS
1590 .aliens LDX aliens%:LD
A#17:JSRos:LDA#2:JSRos
1600 .loop LDAadead%,X:CMP
#1:BEQnext:LDA#31:JSRos:LDA
ax%,X:JSRos:LDAay%,X:JSRos:
LDA#32:JSRos:LDAadir%,X:CMP
#1:BEQleft:CMP#2:BEQright:C
MP#3:BEQup:CMP#4:BEQdown
1610 .print LDA#31:JSRos:L
DAax%,X:JSRos:LDAay%,X:JSRo
s:STXxstore%:LDA#135:JSR&FF
F4:STXscr:LDXxstore%:LDAscr
:CMP#32:BNEhit:LDA#129:JSRo
s:.dec DEX:TXA:CMP#0:BEQend
loop:JMPloop
1620 .next JMP dec
1630 .left DECax%,X:LDAax%
,X:JMPprint
1640 .right INCax%,X:LDAax
%,X:JMPprint
```

```
1650 .up DECay%,X:LDAay%,X
:CMP#6:BMIdown:JMPprint
1660 .down INCay%,X:LDAay%
,X:JMPprint
1670 .endloop JMPreturn
1680 .hit LDAscr:CMP#150:B
CShadit
1690 .hit2 LDYadir%,X:LDAr
andom%,X:STAadir%,X:TYA:CMP#1
:BEQright:CMP#2:BEQleft:CMP
#3:BEQdown:CMP#4:BEQup
1700 .hadit LDA#1:STAmedea
d%:JMPhit2
1710 .return RTS
1720 ]NEXT
1730 ENDPROC
1740 DEFPROCaliens:COLOUR2
1750 FORloop%=1TO?aliens%
1760 ?&70=RND(4)+5:?&71=RN
D(11)+8:CALLcheck:IF?scr<>3
2 THEN 1760
1770 VDU31,?&70,?&71,129:?
(ax%+loop%)=?&70:?(ay%+loop
%)=?&71:?(adead%+loop%)=0:?
(adir%+loop%)=RND(4)
1780 NEXT:ENDPROC
1790 DEFPROCdh(x,y,a$,c1,c
2):LOCALK:FORK=1TOLEN(a$):A
%=ASC(MID$(a$,K,1)):X%=x+K-
1:Y%=y:?col1%=c1:?col2%=c2:
CALLdh:NEXT:ENDPROC
1800 DEFPROCinst:VDU23,1,0
;0;0;0;19,0,4;0;
1810 PROCdh(10,1,"MAZE by
Martin Cottle",1,1)
1820 PRINTTAB(0,4)"Can you
help Barney get out of the
maze?"" You must guide hi
m safely through all  the l
6 rooms whilst destroying a
ll the  creatures you meet
on the way. "
1830 PRINT" Before the doo
rs in each room will openyo
u must shoot all the creatu
res in it. Touching one of
these creatures means   ins
tant death and you will los
e one of  your five lives."
1840 PRINT" On your way yo
u must also collect all  th
e keys in the maze. Without
all of thekeys you cannot
open the exit, which is fou
nd in the room in which you
start,andescape from the m
```

```
aze."
1850 PROCdh(16,20,"CONTROL
S",1,1):PRINTTAB(16,22)"****
******
1860 PRINTTAB(0,23)" Z  -
LEFT             X  -
RIGHT "'" :  - UP
          / - DOWN "'"
          SPACE - FIRE"
1870 PROCdh(5,29,"PRESS SP
ACE TO ENTER THE MAZE.",1,1
)
1880 REPEATUNTILGET=32:*FX
21,0
1890 ENDPROC
1900 DEFPROCend:PROCdh(3,1
6,"GAME OVER",2,1):PROCtun
e:PROCpause(300):GCOL0,0:FO
RI%=0TO639STEP8:MOVEI%,0:DR
AWI%,1000:MOVE1279-I%,0:DRA
W1279-I%,1000:SOUND17,-15,(
I%+1)DIV3,1:NEXT
1910 PROCdh(4,3,"MAZE SCOR
ES",1,2):PROCdh(4,5,"======
=====",3,2)
1920 VDU28,0,31,19,8:IFS%>
HI% PROCinput
1930 PROCdh(1,3,"The high
score is:",2,3):PRINTTAB(0,
7);HI%;
1940 PROCdh(1,10,"By:",1,3
):PROCdh(4,10,H$,2,1)
1950 PROCdh(4,16,"PRESS SP
ACE",1,2):PROCdh(5,19,"TO R
EPLAY",1,2)
1960 REPEATUNTILGET=32:VDU
26,12:*FX21,0
1970 ENDPROC
1980 DEFPROCinput:PROCdh(0
,2,"PLEASE ENTER NAME",3,2)
:INPUTTAB(0,6);H$
1990 IFLEN(H$)>16 H$=LEFT$
(H$,16)
2000 HI%=S%:VDU12:ENDPROC
2010 DEFPROCtune:RESTORE20
20:FORI%=0TO8:READP,D:SOUND
1,-15,P,D:SOUND1,0,0,0:NEXT
:ENDPROC
2020 DATA33,20,5,20,5,10,1
3,10,17,10,13,10,5,10,1,10,
5,30
```

# Trek into your Electron's memory

## STUART LOW tries out a powerful disassembler which impresses despite the odd bug

ONE of the most powerful disassemblers currently available for the Electron is *Trek, enabling you to explore the innermost confines of your micro's memory.

As the program is supplied on rom, you'll need some form of sideways rom expansion board or cartridge to use it.

Typing *HELP TREK prints a help screen displaying all the commands understood by the rom and is shown in Figure I.

The disassembler is entered on power up if there are no other language roms of higher priority or by typing *TREK.

Initially eighty column Mode 3 is selected and you are presented with a list containing the name, number and status of all roms present.

The status information tells you which processor type each rom is intended for – normally on the Electron this is the 6502.

It will also tell you whether it will work across the Tube, for those lucky enough to have a second processor, and whether they are either language or service roms.

Below this display you are prompted for the start and finishing addresses of the area of memory to be disassembled.

An offset address can be given enabling programs meant for sideways roms which start at &8000 to be placed in a lower area of memory before being disassembled.

If the start address lies between &8000 and &BFFF, the area of memory reserved for paged roms, *Trek will ask for the rom you wish to disassemble.

You may select any mode but if any other than 80 column Modes 0 or 3 is selected both Ascii and text

outputs are disabled.

However, these can be re-enabled at any time using the control keys, which I'll come to later.

Before the disassembly begins *Trek asks if you want to send the output to a printer. It is quite intelligent and if you answer yes it checks to see if a printer is connected and on line before proceeding.

The printer can be turned on or off, as can paged mode during disassembly using the normal Basic control keys – B, C, N and O respectively.

Ascii output can be turned on and off with Control+S and A – not A and S as stated in the manual.

During disassembly the Tab key, according to the manual, allows you to input a new start and finish

address. Unfortunately the Electron doesn't have a Tab key.

However, the BBC Micro does and it produces the Ascii code 9. Control+I on the Electron produces the same code and fortunately has the same effect.

This is a far from standard disassembler. What makes it unique is its impressive ability to comment on the code as it disassembles. Take a look at Figure II to see what I mean.

The operating system commands such as osbyte, osword, osfind and osfile are all identified and decoded.

Each is followed by a brief note stating its function, and the function of each memory location accessed is also given.

These interpretations may not be strictly accurate,

however, since it is possible to write in quite obscure ways disguising the true function of the code.

When disassembling the Basic rom the entry point for Basic keywords like INKEY$, RND, SOUND and so on are flagged.

The bytes following a BRK instruction are treated as Ascii text characters and are printed out until another BRK is encountered. This is how Basic stores its error messages.

The contents of an address are displayed if used by an indirect jump. This is useful when following operating system calls through jump vectors.

However, some roms alter these during use and therefore their contents may not

→

```
*TREK the Complete Disassembler 1.06
(C) Tornado Software 1986

Type *TREK   for the Disassembler
     *MEMORY <adr> - BASIC location use
     *OSBYTE <adr> - OSBYTE call info
     *OSWORD <adr> - OSWORD call info
     *OSFIND <adr> - OSFIND call info
     *OSFILE <adr> - OSFILE call info
Syntax: *MEMORY ddddd  (*MEMORY &hhhh)
where d=decimal, h=hex digit

During Disassembly:
  ^B    Printer on        ^C   Printer off
  ^A    ASCII on          ^S   ASCII off
  ^L    Text on           ^K   Text off
  ^N    Page mode on      ^O   Page mode off
  ^V    Screen mode       (follow with 0-7)
   L    Enter Labels       T   Enter Tables
   *    Enter system command
  ^I    Re-enter start & end addresses
SPACE   Fast/Slow Disassembly
```

Figure I: The *Trek help screen

## From Page 37

be accurate.

In addition to commenting on code *Trek allows you to add labels — up to six characters long — to the output.

These can be used to indentify program statements, loops, branches or subroutine entry points.

They can be loaded from or saved to a file enabling you to build up a complete annotated disassembly listing of a machine code program.

Areas of memory used for data or text storage can be output as a hex/Ascii dump. The start and end points of these areas or tables can be saved along with the labels.

You can ask *Trek to comment without entering the disassembler, using star commands from Basic.

Memory will tell you what a particular memory location is used for and osbyte, osword, osfind and osfile

will provide information on these operating system calls.

Unfortunately *Trek does contain a few irritating bugs — for instance Control+K

(intended to disable text output) and certain star commands crashed it.

Bugs aside, this package does seem to have a lot going for it. It is easy to use,

thoroughly comprehensive and even "intelligent".

*Trek is an extremely useful and versatile tool and a virtual necessity for the machine code programmer.



*Figure II: Typical output from *Trek*

---

THIS short program shows some of the interesting effects that are produced when using GCOL plot options outside the normal range.

The syntax of the command is:

GCOL option,colour
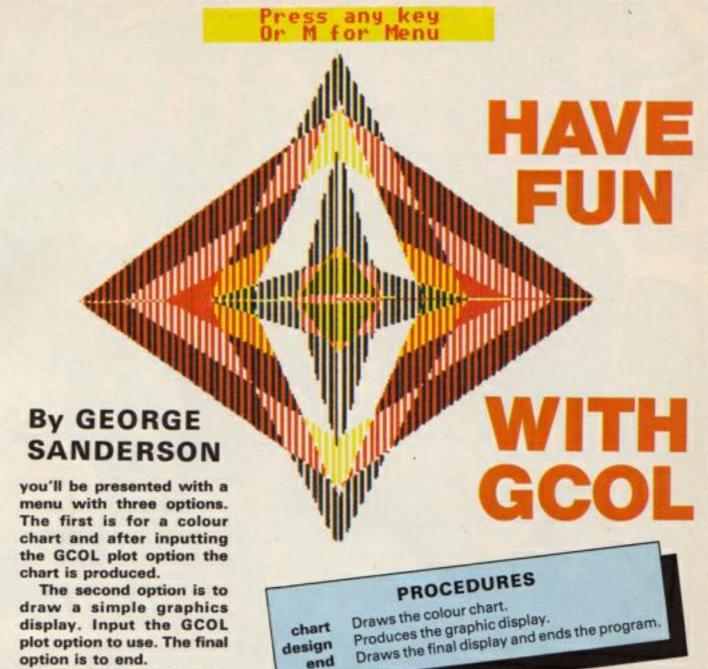
where *colour* is the colour to draw or plot with and *option* specifies the plotting mode.

Plot option 0 means plot the colour straight on to the screen. Options 1 to 3 tell the Electron to OR, AND or EOR the plot colour with the colour of the pixel already on the screen. Option 4 will use the inverse of the plot colour specified.

But what happens if you go outside this range? Well, even Acorn isn't quite sure here since the manual states that "Other values do stripey things...".

This program lets you experiment with GCOL and find out exactly what happens. Some quite unusual patterns and a greater range of colour can be produced with high GCOL plot options.

When the program is run

## By GEORGE SANDERSON

you'll be presented with a menu with three options. The first is for a colour chart and after inputting the GCOL plot option the chart is produced.

The second option is to draw a simple graphics display. Input the GCOL plot option to use. The final option is to end.

That's all there is to it. Enjoy your experimenting!

# HAVE FUN WITH GCOL

## PROCEDURES

chart    Draws the colour chart.
design    Produces the graphic display.
end    Draws the final display and ends the program.

```
   10 REM GCOL
   20 REM By G.R.Sanderson
   30 REM (c) Electron User
   40 MODE1:VDU 23,1,0;0;0;0;
0;
   50 VDU28,3,25,37,3
   60 COLOUR129:CLS
   70 VDU28,5,23,35,5
   80 COLOUR128:CLS
   90 VDU28,7,21,33,7
  100 COLOUR130:CLS:COLOUR1
  110 PRINTTAB(4,2)" (1) Co
lour chart"''TAB(4)" (2) De
sign sample"''TAB(4)" (3) T
o end"''''TAB(4)" Choose a n
umber"
  120 A=GET:VDU26:COLOUR128
:CLS
  130 IFA=49PROCchart
  140 IFA=50PROCdesign
  150 IFA=51PROCend ELSE RU
N
  160 END
  170 DEFPROCchart
  180 COLOUR3
  190 REPEAT
  200 B=0
  210 @%=3
  220 INPUT''"Enter GCOL X,
1 requ.(0 onwards)-->"G:CLS
  230 GCOL0,3
  240 FORY=0TO950STEP44
  250 MOVE0,Y:DRAW1300,Y
  260 NEXT
  270 MOVE200,0:DRAW200,950
  280 REPEAT
  290 FORA=0TO44STEP4
  300 GCOLG,1
  310 PLOT77,500,A+B
  320 NEXT
  330 VDU5
  340 MOVE0,A+B-15:GCOL0,7:
PRINTG
  350 B=B+44:G=G+1
  360 VDU4
  370 UNTILB>900
  380 COLOUR1:COLOUR130
  390 PRINTTAB(10,1)"    Pr
ess any key    "
  400 PRINTTAB(10,2)"    Or
 M for Menu    "
  410 D=GET:COLOUR128:COLOU
R3:CLS
  420 UNTILD=77
  430 ENDPROC
  440 DEFPROCdesign
  450 COLOUR3
  460 REPEAT
  470 INPUT''"Start GCOL nu
mber (0 onwards)",C
  480 CLS
  490 X1=600:Y1=350:X2=0
  500 VDU29,630;450;
  510 MOVE400,0
  520 REPEAT
  530 GCOLC,1
  540 FORX=0TO360STEP90
  550 MOVE0,0
  560 PLOT85,COS(RAD(X))*X1
,SIN(RAD(X))*Y1
  570 NEXT
  580 X2=X2+1
  590 X1=X1-100:Y1=Y1-90:C=
C+1
  600 UNTILX2=10
  610 COLOUR1:COLOUR130
  620 PRINTTAB(10,1)"    Pr
ess any key    "
  630 PRINTTAB(10,2)"    Or
 M for Menu    "
  640 D=GET:COLOUR128:COLOU
R3:CLS
  650 UNTILD=77
  660 ENDPROC
  670 DEFPROCend
  680 COLOUR130
  690 MOVE425,475
  700 FORX=0TO360STEP18:MOV
E425,475:GCOLRND(12)+70,1
  710 PLOT85,COS(RAD(X))*X*
1.5+425,SIN(RAD(X))*X*1.5+4
75
  720 NEXT
  730 PRINTTAB(18,14)SPC(9)
  740 PRINTTAB(18,15)" GOOD
BYE "
  750 PRINTTAB(18,16)SPC(9)
  760 VDU23;26378;0;0;0;
  770 VDU4:VDU30
  780 COLOUR128:COLOUR3
  790 ENDPROC
```

*This listing is included in this month's cassette tape offer. See order form on Page 53.*

# TOMMY & the TOADSTOOLS

## By STUART BAIN

THE evil Wizard Wongo has cast a spell on Cadzow Forest causing all the poisonous toadstools to come to life.

One day when he's out walking in the forest the toadstools start to chase poor Tommy, a little schoolboy.

Now he's lost and needs your help to escape. You must guide Tommy along the platforms and up the ladders back to his house.

There are toadstools to avoid, holes to jump and moving bridges to negotiate, so it's no easy task. To make matters worse there's a time limit.

There is a bonus for completing each screen within the time limit, and there are toffees to collect on the way. Watch out for those deadly toadstools.

The keys are:

Z = left
X = right
? = down
• = up
Return = jump

## PROCEDURES

| | |
|---|---|
| moves | Moves the man. |
| score | Displays the score. |
| sweet | Bonus for collecting sweet. |
| toadstools | Moves the toadstools. |
| table | Print high scores. |
| screen | Draws the screen. |
| house | Draws the house. |

## VARIABLES

| | |
|---|---|
| live% | Lives left. |
| X%,Y% | Coordinates of man. |
| score% | Score. |
| dir% | Direction of bridge. |
| toad$ | Toadstool characters. |
| bonus% | Bonus. |
| man$() | Tommy. |
| hi%() | High scores. |
| nm$() | Names. |

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## Play Micro Olympics — and let your fingers do the running!

**Send for it today**

### From Page 41

```
  10 REM * Tommy and the *
  20 REM * Toadstools  *
  30 REM *By Stuart Bain*
  40 REM (c) Electron User
  50 PROCinit:*FX16
  60 ONERROR IFERR<>17MODE6:VDU10,10,10:REPORT:PRINT" at line ";ERL:END
  70 REPEAT
  80 MODE6:PROCtitle
  90 MODE5:PROCstart
 100 REPEAT:REPEAT
 110 PROCmove
 120 IF(POINT(X%+32,Y%-32)=1ORPOINT(X%+32,Y%-32)=3)ANDladd%=FALSE dead%=TRUE
 130 IFdead%GOTO160
 140 PROCtoadstools
 150 IF(POINT(X%+32,Y%-32)=1ORPOINT(X%+32,Y%-32)=3)ANDladd%=FALSE dead%=TRUE
 160 UNTILdead%ORY%>=991
 170 IFdead%PROCdead ELSEPROCnewsheet
 180 UNTILlive%<1
 190 PROCgameover
 200 MODE6:PROChiscores
 210 UNTIL0
 220
 230 DEFPROCmove
 240 IFINKEY-49THEN*FX210,1
 250 IFINKEY-50THEN*FX210,0
 260 IFINKEY-56REPEATUNTILINKEY-52
 270 bonus%=bonus%-10:COLOUR3:PRINTTAB(10,1);STRING$(4-LENSTRbonus%,"0");bonus%:IFbonus%=0dead%=TRUE:ENDPROC
 280 x%=X%:y%=Y%
 290 IFjump%PROCjump:GOTO380
 300 H%=(FNleft-FNright)*64
 310 IFFNjump ANDNOTladd%SOUND1,-15,20,1:jump%=TRUE:jump1%=0:PROCjump:GOTO380
 320 IFX%+H%>1216ORX%+H%<0 H%=0
 330 IFladd%H%=0
 340 X%=X%+H%:IFH%GOTO380
 350 IFFNup ANDPOINT(X%,Y%-32)=3ladd%=TRUE:Y%=Y%+32
 360 IFFNdown ANDPOINT(X%,Y%-64)=3ladd%=TRUE:Y%=Y%-32
 370 IFPOINT(X%+32,Y%-64)=1ANDladd%ladd%=FALSE:PROCman(x%,y%):man%=0:man1%=0:PROCman(X%,Y%):ENDPROC
 380 IFPOINT(X%,Y%-64)=0ANDjump%=0dead%=TRUE
 390 IFX%=x%ANDY%=y%ENDPROC
 400 PROCman(x%,y%)
 410 IFPOINT(X%+8,Y%)=2PROCsweet
 420 IFH%=FALSE ANDNOTladd%GOTO440
 430 man%=(man%+1)MOD2:man1%=0:IFH%<0man1%=2ELSEIFladd%man1%=4
 440 PROCman(X%,Y%)
 450 ENDPROC
 460
 470 DEFPROCjump
 480 jump1%=jump1%+1:V%=32:IFjump1%>2V%=-32
 490 IFX%+H%>1216ORX%+H%<0 H%=0
 500 X%=X%+H%:Y%=Y%+V%
 510 IFjump1%>3jump%=FALSE
 520 ENDPROC
 530
 540 DEFFNleft
 550 IFINKEY-98ORFNjoy=4ORFNjoy=20=TRUE
 560 =FALSE
 570 DEFFNright
 580 IFINKEY-67ORFNjoy=8ORFNjoy=24=TRUE
 590 =FALSE
 600 DEFFNjump
 610 IFINKEY-74ORFNjoy>8=TRUE
 620 =FALSE
 630 DEFFNup
 640 IFINKEY-73ORFNjoy=1=TRUE
 650 =FALSE
 660 DEFFNdown
 670 IFINKEY-105ORFNjoy=2=TRUE
 680 =FALSE
 690
 700 DEFFNjoy=(127-?&FCC0)*-joy%
 710 DEFPROCman(x%,y%)
 720 GCOL3,2:MOVEx%,y%:VDU5:PRINTman$(man%+man1%):VDU4
 730 ENDPROC
 740 DEFPROCsweet
 750 MOVEX%+64,Y%:GCOL3,3:VDU5,127,238:SOUND3,-15,200,2:score%=score%+50:PROCscore
 760 ENDPROC
 770 DEFPROCscore
 780 IFscore%>99999score%=score%-100000
 790 VDU4:COLOUR3:PRINTTAB(0,3);"SCORE:";STRING$(5-LENSTR$score%,"0");score%
 800 ENDPROC
 810
 820 DEFPROCtoadstools
 830 IFscreen%<>1PROCbridge
 840 T%=(T%+1)MOD5
 850 toad$=toad$(T%)
 860 IFscreen%=3ANDT%=2PROCtstools:ENDPROC
 870 IFtoad$=""ENDPROC
 880 chr$=CHR$32:IFRND(5-(screen%=1))=1chr$=CHR$226
 890 IFT%MOD2toad$(T%)=chr$+LEFT$(toad$,17)ELSEtoad$(T%)=RIGHT$(toad$,17)+chr$
 900 row%=(32-(T%*5+7))*32-1
 910 GCOL3,3:MOVE64,row%:VDU5:PRINTtoad$
 920 MOVE64,row%:PRINTtoad$(T%):VDU4
 930 ENDPROC
 940 DEFPROCtstools
 950 t$=LEFT$(toad$,5)+RIGHT$(toad$,5):chr$=CHR$32:IFRND(4)=1chr$=CHR$226
 960 t$=RIGHT$(t$,9)+chr$:toad$(2)=LEFT$(t$,5)+STRING$(8," ")+RIGHT$(t$,5)
 970 GCOL3,3:MOVE64,479:VDU5:PRINTtoad$:MOVE64,479:PRINTtoad$(2):VDU4
 980 ENDPROC
 990 DEFPROCbridge
1000 plat%=plat%+dir%:IFplat%=7ORplat%=11dir%=-dir%
1010 VDU17,1,31,plat%-1,18,32,224,224,32
1020 IFT%=1FORI=1TO130:NEXT
1030 IFPOINT(X%,Y%-64)=0ANDjump%=FALSE dead%=TRUE
1040 ENDPROC
1050 DEFPROCdelay(D%):TIME=0:REPEATUNTILTIME>D%:ENDPROC
1060
1070 DEFPROCdead
1080 SOUND1,3,119,45:PROCdelay(300)
1090 REPEAT:PROCman(X%,Y%):Y%=Y%-64:PROCman(X%,Y%):SOUND0,0,0,0:SOUND1,-15,Y%/8,-1:UNTILY%<97
1100 PROCman(X%,Y%):SOUND0,0,0,0
1110 live%=live%-1:IFlive%<1ENDPROC
1120 bonus%=3000:PROCscreen:ENDPROC
1130
1140 DEFPROCnewsheet
1150 VDU28,4,16,15,14:COLOUR131:CLS:COLOUR0:PRINT'" BONUS:";STRING$(4-LENSTRbonus%,"0");bonus%:VDU26
1160 RESTORE1180:FORI%=1TO19:READA:SOUND1,-15,A,2:NEXT
1170
1180 DATA 4,52,12,60,20,68,24,72,32,80,40,88,48,96,52,100,100,100,100
1190 screen%=screen%+1:IFscreen%>3screen%=1:live%=live%+1:IFlive%>9live%=9
1200 score%=score%+bonus%:bonus%=3000
1210 PROCscreen:ENDPROC
1220 DEFPROCgameover
1230 PROCdelay(100)
1240 VDU28,4,16,14,14:COLOUR131:CLS:COLOUR0:PRINT'" GAME OVER":VDU26
1250 RESTORE1270:FORI%=1TO14:READA,B:SOUND1,-15,A+48,B*1.3:SOUND1,0,0,B:NEXT
1260 REM PLAYS GAMEOVER TUNE
1270 DATA12,4,12,2.5,32,10,12,4,32,2.5,48,10
1280 DATA12,4,32,2.5,48,5,12,4,32,2.5,48,5,12,5,32,10
1290 PROCdelay(300):ENDPROC
1300
1310 DEFPROChiscores
1320 VDU23,1,0;0;0;0;:*FX21,0
1330 place%=0:REPEAT:place%=place%+1:UNTILplace%=9ORscore%>hi%(place%)
1340 IFplace%=9GOTO1420
1350 FORI%=8TOplace%STEP-1:hi%(I%)=hi%(I%-1):na$(I%)=na$(I%-1):NEXT:hi%(place%)=score%:na$(place%)="":PROCt
```

able

```
1360 VDU31,0,5:PROCmiddle(
"Please enter your name"):n
ame$="":Y%=2*place%+5
 1370 REPEAT:REPEAT:X%=GET:
UNTILX%>31ANDX%<128ORX%=13
 1380 IFX%=127ANDLENname$>0
name$=LEFT$(name$,LEN(name$
)-1)
 1390 IFX%>31ANDX%<127ANDLE
Nname$<10name$=name$+CHR$X%
 1400 PRINTTAB(25,Y%);name$
;" ":UNTILX%=13
 1410 na$(place%)=name$
 1420 PROCtable:PRINTTAB(9,
24);"Press SPACE to replay"
;:REPEATUNTILINKEY-99:ENDPR
OC
 1430 DEFPROCtable
 1440 PROCheader
 1450 FORI%=1TO8:PRINTTAB(5
,I%*2+5);I%;") ";STRING$(5-
LENSTR$hi%(I%),"0");hi%(I%)
;"............";na$(I%):NEX
T
 1460 ENDPROC
 1470
 1480 DEFPROCinit
 1490 VDU23,224,255,24,36,3
6,66,66,129,255
 1500 VDU23,225,129,129,129
,129,255,129,129,129
 1510 VDU23,226,24,126,255,
255,24,24,24,60
 1520 VDU23,237,64,192,56,6
0,60,28,3,2
 1530 VDU23,238,0,0,238,138
,234,42,238,0
 1540 VDU23,227,28,63,128,1
18,97,34,28,60,23,228,110,1
10,110,118,60,24,24,28,23,2
29,126,126,247,251,60,118,1
10,119
 1550 VDU23,230,56,252,30,1
10,134,60,56,60,23,231,118,
118,118,110,60,24,24,56,23,
232,126,126,239,223,60,110,
118,238
 1560 VDU23,233,152,180,189
,189,153,255,126,126,23,234
,126,126,126,255,129,129,1,
1
 1570 VDU23,235,25,61,189,1
89,153,255,126,126,23,236,1
26,126,126,255,129,129,128,
128
```

```
 1580 VDU23,250,1,3,7,15,31
,63,127,255,23,251,140,204,
236,252,252,252,254,255,23,
252,255,132,132,132,252,252
,252,252,23,253,255,33,33,3
3,63,63,63,63
 1590 DIMman$(5),toad$(4),h
i%(9),na$(9):FORI%=1TO8:hi%
(I%)=1700-I%*200:na$(I%)="B
AINY SOFT":NEXT
 1600 line$=CHR$8+CHR$10
 1610 RESTORE1620:FORI%=0TO
5:READA,B:man$(I%)=CHR$A+li
ne$+CHR$B:NEXT
 1620 DATA227,228,227,229,2
30,231,230,232,233,234,235,
236
 1630 ENVELOPE3,1,-10,-37,-
89,24,13,46,126,0,0,-126,12
6,126
 1640 ENDPROC
 1650 DEFPROCstart
 1660 live%=3:score%=0:bonu
s%=3000:screen%=1
 1670 PROCscreen
 1680 ENDPROC
 1690 DEFPROCscreen
 1700 VDU23,1,0;0;0;0;:COLD
UR128:CLS
 1710 COLOUR1:FORI%=8TO28ST
EP5:PRINTTAB(0,I%);STRING$(
20,CHR$224);:NEXT:PRINTTAB(
17,3);CHR$224;CHR$224;CHR$2
24;
 1720 COLOUR2:FORI%=4TO14ST
EP10:VDU31,0,I%,237,31,19,I
%+5,237:NEXT
 1730 FORI%=8TO18STEP10:PRO
Cladder(0,I%):NEXT:FORI%=3T
O23STEP10:PROCladder(19,I%)
:NEXT
 1740 PROChouse
 1750 GCOL0,1:MOVE608,1008:
DRAW928,1008:DRAW928,944:DR
AW608,944:DRAW608,1008
 1760 PROCscore:PRINTTAB(0,
1);"LIVES:";live%TAB(10,1);
STRING$(4-LENSTR$bonus%,"0"
);bonus%TAB(12,3);"L=0";scr
een%
 1770 PROCsetvar
 1780 RESTORE1800:FORI%=1TO
13:READA:SOUND1,-15,A,3:NEX
T:SOUND1,-15,101,7
 1790 REM PLAYS START TUNE
 1800 DATA101,117,129,117,1
```

```
09,121,137,121,101,117,129,
117,101
 1810 PROCdelay(200)
 1820 ENDPROC
 1830
 1840 DEFPROChouse
 1850 COLOUR1:VDU31,17,1,25
0,251,0,8,10:COLOUR3:VDU252
,253
 1860 ENDPROC
 1870
 1880 DEFPROCsetvar
 1890 X%=0:Y%=191:man%=0:ma
n1%=0:PROCman(X%,Y%):jump%=
FALSE:ladd%=FALSE:dead%=FAL
SE
 1900 T%=0:FORI%=0TO4:toad$
(I%)="":FORJ%=1TO18:chr$=CH
R$32:IFRND(5-(screen%=1))=3
chr$=CHR$226
 1910 toad$(I%)=toad$(I%)+c
hr$:NEXT:NEXT
 1920 ONscreen%GOSUB1940,19
70,2020
 1930 ENDPROC
 1940 REM *SCREEN 1*
 1950 GCOL3,3:VDU5:FORI%=0T
O4:MOVE64,(32-(I%*5+7))*32-
1:PRINTtoad$(I%):NEXT:VDU4
 1960 RETURN
 1970 REM *SCREEN 2*
 1980 toad$(2)="":GOSUB1940
 1990 PRINTTAB(6,18);SPC8;
 2000 plat%=7:dir%=1:COLOUR
1:VDU31,plat%,18,224,224
 2010 RETURN
 2020 REM *SCREEN 3*
 2030 GOSUB1970:FORI%=1TO10
:chr$=CHR$32:IFRND(4)=3chr$
=CHR$226
 2040 toad$(2)=toad$(2)+chr
$:NEXT:toad$(2)=LEFT$(toad$
(2),5)+STRING$(8," ")+RIGHT
$(toad$(2),5)
 2050 GCOL3,3:MOVE64,479:VD
U5:PRINTtoad$(2):VDU4
 2060 RETURN
 2070 DEFPROCladder(X,Y)
 2080 VDU5:GCOL0,3:MOVEX*64
,(32-Y)*32-1:FORI=1TO5:VDU2
25,8,10:NEXT
 2090 VDU4:ENDPROC
 2100 DEFPROCheader
 2110 CLS:VDU23,1,0;0;0;0;
 2120 PRINTTAB(7,1);STRING$
(24,"-")'TAB(5);CHR$226;" T
OMMY and the TOADSTOOLS ";C
HR$226'TAB(7);STRING$(24,"-
```

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I HAVE recently bought an Electron for my five-year-old son as a Christmas present and, as I know next to nothing about computers, I am hoping you can help me.

I have bought the October and November 1986 issues of your magazine in the hope that these would help.

What I need is information on software suitable for a five-year-old.

I have sent for the Fun School and Classic Arcade Games tapes, the first because it gave an average age and the second because he can play two of the four games.

The Adventure game you advertise, The Magic Sword, is said to be suitable for small children but at five your reading is limited and I do not know if this is ok.

I hope you can see my problem. I have tried both my local computer stores, but their Electron software is very limited and they were not very helpful in my request for equipment to suit the younger child.

Any ideas you have for literature for myself to help him, or a list of software suitable would be very much appreciated. – **M. Purnell, Croesyceiliog, Cwmbran, Gwent**

● You'll find a four page pull-out guide to educational software in the September 1985 issue of Electron User. This lists all the software that was available at the time (there's even more now), describes each product and supplies the address of the company.

Also many of the programs we have published in the past three years can be used by young children. Crocodile Tears in the May 1986 issue is particularly good.

The Magic Sword can be used by young children but they may need a little help from an adult at first. They soon get the hang of it though.

## Easy on the eyes

AFTER inputting about half a long program the other day, my eyes became so crossed following the listing in Electron User that my super lazy streak came to the fore to find an easier way.

I dictated the program on to cassette and played this back, at the same time typing in the program.

Checking for bugs is sim-

# Software for a five-year-old

pler as well, just play the tape and follow the listing on the screen.

However remember that the speed of dictation is the speed at which you will have to type in the program.

Try it to make life easier and improve accuracy. – **Raymond Speare, Stoke Hill, Exeter.**

## Constricted crocodile

FOR some time I have enjoyed your listings and played the results with great pleasure but now I have a problem.

Some of the programs I have typed in like Crocodile Tears don't work and give the message "No room at line".

Could it be because I have a Plus 1 connected to my Electron?

I also want to say that your latest program Howzat is a lot of fun and tells me how cricket is to be played, because in Holland nobody really knows. – **Patrick van der Pas, Rijswijk.**

● The Plus 1 does not affect the memory available for Basic programs, so this isn't the problem.

Many programs are rather tight on memory and you need to take care when entering listings.

Do not enter any spaces except where absolutely necessary, otherwise you'll run out of memory and the program will stop with an error report.

## Balanced diet for all

I'M INTO my third year of Electron User and what do I think of it so far?

Having dallied on occasions with other computer periodicals I am convinced that Electron User is still the only magazine for Electron owners presenting as it does a nicely balanced diet for all, from beginners to experienced hacks.

The features which, I think, set its high standard are:

● The regular informative articles by R. Waddilove – I suspect this is really a near-intelligent computer which churns out these programs when required.

● The excellent reader-involvement section Micro Messages.

● The clever, artistic illustrations. These are always witty and relevant (don't tell me these are also done by R. Waddilove).

In some instances the illustrations are of a higher standard than the actual games. For example those for A Day At The Races far surpassed the game which I found dull and featureless.

(There is a bit of sour grapes here, of course, as I had offered you a more real-

# Tips for the Plus 3 fraternity

I READ with interest the letter from Mr. Richard Billinghurst in Micro Messages, December 1986, regarding the addition of a second disc drive to an Electron and Plus 3 setup.

I agree with your reader that the Plus 3 manual is somewhat vague as to such an addition.

I have recently successfully added a further drive to my Plus 3, in my case a 5.25in drive.

I would like to offer some advice gained from my experience to potential second drive purchasers

among your readers.

The Plus 3 will take any size disc drive provided it has its own mains power supply. (I bought Watford Electronic's CS400S).

The ADFS automatically copes with the larger size and storage capacity of a 5.25in drive.

A card edge connecting unit is required (costing under £4), which is clamped on to the cable of the new drive and connects to the edge connector at the rear of the Plus 3's own drive.

It is essential that when you buy your new drive it is

switched internally to drive 1, otherwise it will not work. This can be completed in a few minutes by any reputable dealer.

I hope that this will be of assistance to your readers and help them to avoid some of the pitfalls I encountered.

I have had a second drive now for two months and can thoroughly recommend it. It really takes the ache out of the *BACKUP and *DIR-COPY commands.

Many thanks for a fine magazine. – **John Thorogood, Bishops Stortford,**

istic and graphic horse race game shortly before your publication).

Collectively my Electron Users are a mine of information, advice and ideas. But searching through the mine can be time consuming and chaotic.

I am sure that many subscribers, like myself, refer to their copies constantly for programming and technical information.

Have you considered the publication of an annual index of the year's contents? – **V. J. Horgan, Didcot, Oxon**

● We've had suspicions for some time that Roland might be Database's answer to Metal Mickey.

However, the superb artwork you refer to is by a charming young lady called Pam Dunkerley.

Sorry we couldn't publish your horse race game. Two excellent racing programs arrived within days of each other and it was a pity we couldn't use them both. There was nothing to choose between the two so literally a toss of the coin decided which we were going to use.

We like the idea of an index and we'll bear it in mind for the future.

## Alternative language

IN the not too distant future I am considering buying the Lisp, Logo and Pascal rom cartridges, but before I go to any great expense, I should like to know more information regarding their purpose. – **B.R. Rushforth, Bradford, West Yorkshire**

● These are alternative programming languages to BBC Basic. Some languages are more suited to a particular type of application than others.

We haven't the space to go into any depth here but you'll find a full review of the cassette versions of Lisp and Pascal in the February and March 1985 issues of Electron User.

The rom versions have many more functions and

enable you to write much bigger applications.

We haven't reviewed Logo, but Mike Plummer's Pogo is a good introduction to the language. This two part series can be found in the December 1986 and January 1987 issues of Electron User.

## Morse on the Electron

WITH regard to the letter from Mr. Coggin in the November 1986 Electron User, I wish to confirm that the Centronics output of the Plus 1 can indeed be used for the activation of external devices.

I am using these ports for sending and receiving morse code via my amateur-band transceiver.

However, instead of poking the address directly:

```
?&FC71=value
```

I am using the "official" Acorn routine for writing to the port, as this ensures correct operation irrespective of possible different versions of the Electron or whether a second processor is present.

In Basic this routine is as follows:

```
A%=&93
X%=&71
Y%=value
CALL &FFF4
```

Any masking of the bits can be directly carried out on Y% before the call. The machine code equivalent is:

```
LDA #&93
LDX #&71
LDY #value
JSR &FFF4
```

As yet I have been unable to read from this port and I suspect that it is configured for write-only by the hardware.

In my case I am using bit 7 of address &FC72 as the input port. The official method of reading is somewhat long-winded in Basic:

```
A%=&92
X%=&72
Y%=0
value%=(USR(&FFF4)AND &FF00
00)DIV &10000
```

If bit 7 is set a value of 192 is returned on my machine, so:

```
bit%=value% DIV &BF
```

returns a 1 for bit set, 0 if not set. A direct peek is much simpler if an "unofficial" routine will work on your machine:

```
bit%=(?&FC72 AND &80)DIV &8
0
```

which returns a 1 for a bit set. The machine code routine is simpler:

```
LDA #&92
LDX #&71
LDY #0
JSR &FFF4
STY &70
```

the value of the port is now in &70 from where it can be recovered by a direct peek:

```
value%=?&70
```

Incidentally, this port requires a negative logic to give the 1s and 0s.

Finally, the so-called slow Electron can send and receive morse code much quicker than the average human can! And that's using only Basic programs. – **A.E. Ashby, Knottingley, West Yorks.**

## Adding a database

I BOUGHT my Electron in September 1985 and since then I have added a Plus 1 and Plus 3 with View word processor. I would now like to add a database to my system and am particularly interested in Acornsoft's Viewstore.

Can you tell me if this can be obtained on rom cartridge for the Electron? I cannot find any reference to this anywhere. – **Paul Quinn (age 10), Barrhead, Glasgow**

● Viewstore is only available for the BBC Micro on rom. We haven't tried it on the Electron but one of our readers has reported that it works ok.

You'll need some means of plugging the rom in – for instance a blank cartridge or Rombox. The Electron's keyboard layout is different to the BBC Micro and the new keys to use can be found in Micro Messages July 1986.

## Lacking lower case

I AM sure somebody out there can help me! Being completely non-technically minded, I was very proud of myself when shortly after receiving my Plus 3 I managed to create !BOOT files for my discs, the one for View consisting of:

```
*WORD
MODE 3
PRINTER SR400
MICROSPACE
LOAD LETTERHEAD
*CAT
```

This does nearly everything I need, but to me two things are still lacking, one very important and one less so but desirable.

Try as I might I cannot find how to enter an instruction to put my Electron into lower case – and for goodness sake, who wants to write letters all in capitals?

Also I usually enter Control+S followed by 04000 (to change the background to blue), to ease the strain on

my poor aged eyes – but how do you do that in a !BOOT file? I tried S 04000 but that didn't work.

So if one of the tame genii among your readers can supply me with the correct sequence of hieroglyphics to pad out my !BOOT I should be most grateful. – **Mrs. M. Charlton, Kingston Park, Newcastle upon Tyne.**

● Insert the following lines just before *CAT:

```
*FX202,48
*KEY0 |S04000
*FX138,0,128
```

The first command switches the Caps lock light off and the other two define a function key to change the background colour to blue.

# Switching characters

EARLY this year we bought an Electron with which we are delighted and we have recently added a printer – a Panasonic KP–X1080.

My problem is that I would like to be able to change from English to the German or French character sets while printing a document.

This is not possible with the otherwise excellent Mini Office word processor which we have at present.

Please could you tell me which of the word processing packages currently available for the Electron, on cartridge or cassette, will enable me to send control codes directly to the printer.

Regrettably, the Electron seems to have disappeared entirely from our local shops and with it any source of information. Three cheers for Electron User which more than fills the gap! – **Helen Muir, Crewe, Cheshire**

● We haven't had any experience of Panasonic printers but if it is Epson compatible you should be able to select a character set by sending the following sequence of codes to the printer: 27,82,n where n is the character set.

To do this you'll need a word processor that allows you to insert printer control codes.

Acornsoft's View and Slogger's Starword both enable you to this. However, you'll need a printer driver generator to go with them.

Slogger can supply a suitable program for Starword and you'll find a View driver in the August 1986 issue of Electron User. Alternatively, you can use Acornsoft's View Printer Driver Generator for the BBC Micro – we haven't tried it ourselves but many of our readers have reported that it works ok.

# Random reflections

I HAVE now had my Electron for quite a while, and until recently I was convinced that the random number generator fed out an unpredictable sequence of numbers.

However this seems not to be the case. Immediately after turning on your Electron, type in and run this small program:

```
10 CLS
20 FOR i=1 TO 10
30 PRINT;RND(100)
40 NEXT
```

Your Electron will generate the numbers 19, 29, 27, 90, 79, 55, 9, 98, 29. There may be a slight variation if you have a Plus 1 or Plus 3 fitted.

If you turn off your Electron and repeat the operation the same sequence of numbers will appear. Not exactly unpredictable, is it?

More importantly, this means that every time a program is run which uses random numbers to control events, it will be possible to predict those events.

Snap Dragon in the July 1986 issue written by Keith Owens and myself, will illustrate what I mean.

Turn off your Electron, then turn it on and load and run Snap Dragon (assuming that you already have it saved).

If a Plus 1 and Plus 3 are fitted the first cards printed will be as follows: Queen of Diamonds, Jack of Hearts, Ace of Diamonds, Ace of Diamonds and so on.

Every time Snap Dragon is loaded immediately after your Electron is turned on, these cards will be repeated.

The cards may vary slightly if you do not have a Plus 1 and Plus 3 fitted.

Before buying my Electron I used to own a Texas computer which contained within it's Basic language the command RANDOMIZE.

This reseeded the random number generator so that it produced an unpredictable sequence of numbers every time it was used.

Is there a similar command available on the Electron? If there is, I have never seen any reference to it.

My own solution to this problem is as follows: For any program relying on the random number generator add the folowing line:

```
CLS:INPUT TAB(2,16)"Input a
number between 1 and 100:"
num%:FORI%=1 TO num%:A=RND:
NEXT
```

Just insert it into an appropriate place near the start of your programs and, provided you input a different value into num% each time you switch on, your Electron will become almost unpredictable.

In Snap Dragon it should be inserted at line 55, and should be preceded by the condition IF Z%=0 . . . This will ensure that the routine will only be called once, when the Electron is first switched on.

Because Snap Dragon runs in Mode 1 there is not a great deal of memory to spare, so just by adding this extra line you may get the dreaded 'No room' error message.

If so, don't worry, just delete the lines holding the instructions, 1960 to 1990. You probably know them by now anyway. You will now have all the memory you need.

I hope this tip proves useful to your readers. Many thanks for a great magazine. – **Philip Ord, Egremont, Wallasey, Merseyside.**

● When the Electron powers up it seeds the random number generator with the same value each time – it's written into the Basic rom.

The random numbers generated are in fact not random but follow a very complex sequence based on this seed. If the seed is the same each time it follows that the sequence will be the same also.

A quick and simple method of seeding the generator is with:

```
R%=RND(-TIME)
```

A suitable place to insert this would be just after the instructions.

The time taken to read these will always be slightly different so the random number generator will be seeded with a different number each time.

# Epson dump

HAVE you ever published a screen dump for an Epson, or Epson compatible printer? If any readers know of one, I would be most grateful for any information. – **Simon Barker, Cowes, Isle of Wight**
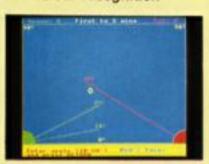
● We have published several screen dumps – the most recent were in the June 1986 issue of Electron User where you'll find dumps for both Shinwa and Epson printers.

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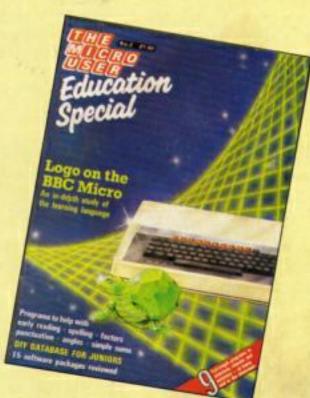
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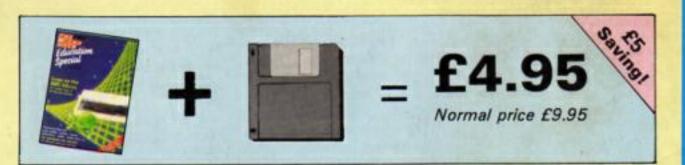
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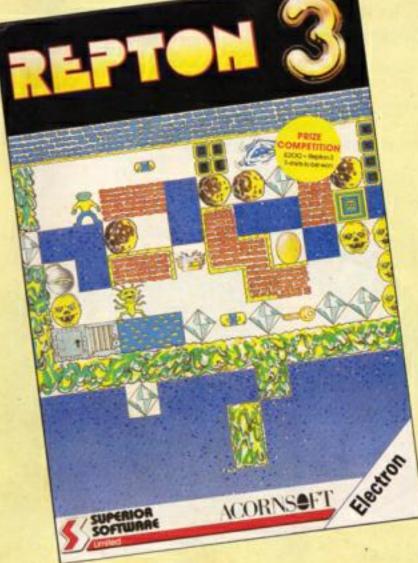
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# Space Invaders

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```
SCORE=5                    AMMO=117
```

```
1 BX=0:BY=0:bX=1:MODE4:
VDU23,225,24,60,126,219,126
,36,66,129,23,226,16,64,2,3
2,149,81,58,124,23,224,0,0,
8,73,93,62,127,127,23,227,0
,68,40,60,123,152,20,0,19,1
,RND(7);0;23,1,0;0;0;0:ENVE
LOPE1,1,-15,-8,-3,10,10,10,
0,0,0,0,0,0,0:CLS:XX=19:YX=27
2 FORI=10TO1279STEP10:M
OVE1,110:MOVE1-10,110:PLOT8
5,1-RND(10),RND(15)+110:NEX
T:S=0:A=120:REPEAT:PRINTTAB
(2,30)"SCORE=";S;TAB(22,30)
"AMMO=";A;" ";TAB(XX,YX)" "
;;XX=XX+INKEY(-98)-INKEY(-6
7):IFXX<1XX=1ELSEIFXX>38XX=
38 ELSEIFINKEY(-74)PROCfire
3 PRINTTAB(XX,YX)CHR$(2
24);;IFbX=1 AND RND(30)=1 B
X=RND(38):BY=1:PROCbomb ELS
EIFbX=0 PROCbomb
4 UNTILFALSE
5 DEFPROCbomb:PRINTTAB(
```

```
BX,BY)" ";:IFXX>BX BX=BX+1
ELSEIFXX< BX BX=BX-1
6 RF=RND(3)-2:BX=BX+RF:
BY=BY+1:IFBX=XX AND BY=YX S
OUND0,-15,6,10:PRINTTAB(7,2
3)"DEAD!"''''"PRESS P TO PLA
Y AGAIN":REPEAT:K$=GET$:UNT
ILK$="P":RUN
7 PRINTTAB(BX,BY) CHR$2
25:bX=0: IF BY=27 bX=1:PRINT
TAB(BX,BY)CHR$226;;SOUND0,-
15,4,5:S=S+5
8 ENDPROC
9 DEFPROCfire:IFA=0GOTO
10ELSEA=A-1:SOUND&11,1,255,
5:GCOL0,1:MOVE(XX*32)+16,14
0:DRAW(XX*32)+16,1000:GCOL0
,0:DRAW(XX*32)+16,140:IFXX=
BX SOUND0,-15,5,8:PRINTTAB(
BX,BY)CHR$227;;bX=1:FORw=1T
O150:NEXT:PRINTTAB(BX,BY)"
";;bX=1:BX=0:BY=0:S=S+50
10 ENDPROC
```

# Mandala

HERE'S a short listing by S. Collins to produce an interesting mandala pattern.



```
1 MODE1:FLAG=0:L=1
2 GCOL0,L:A=800:B=600
3 FORF=0 TO 15:MOVE 600
,A:DRAWB,500:A=A-20:B=B+20:
NEXT
4 FORF=0 TO 15:MOVE600,
A:DRAWB-10,500:A=A-20:B=B-2
0:NEXT
5 FORF=0 TO 15:MOVE600,
A:DRAWB-10,500:A=A+20:B=B-2
0:NEXT
6 FORF=0TO15:MOVE600,A:
DRAWB+10,500:A=A+20:B=B+20:
NEXT
7 IF FLAG=0 FLAG=1 ELSE
FLAG=0
8 IF FLAG=1 GCOL0,7:GOT
O3
9 IFL=0 OR L=1 L=L+1 EL
SE L=0
10 GOTO2
```

## First program

TRY typing the following into your Electron, remembering to press the Return key at the end of every line:

```
10 first=100
20 second=200
30 sum=first+second
40 PRINT sum
```

As you'll know by now this is a program. Not that it does much. It just sits in the micro's memory waiting.

Clear the screen with CLS and you'll see whatever you've typed in disappear from the display.

But while you may not now be able to remember what you've typed in, the Electron does. Or at least it remembers the lines that began with numbers.

You can prove this by telling the micro to list them out with LIST, when the program will duly appear.

The trouble is it's still not doing anything. And it's no surprise. The reason it's not doing anything is that you've not told it to do anything!

The Electron is a typical Jobsworth. You know the type – they'll do what they're told to do but do nothing on their own initiative as "It's more than my job's worth".

So get the computer to run the program by using the aptly named command RUN. And unless you've made a typing error, the answer 300 will appear on the screen.

There should be no mystery as to why this has happened. The first two lines of the program assign values to the numeric variables *first* and *second* while the third line adds the two values and stores the result in another numeric, *sum*. The next line uses PRINT to display this. And that sums up the first program.

## Concatenation

Flushed with success from the last program, let's move on to:

```
10 moggy$="cats"
20 mutt$="dogs"
30 space$=" "
40 fullStop$="."
50 weather$=moggy$+space$+"and"+space$+m
utt$
60 PRINT "It's raining" weather$ fullSto
p$
```

From the dollar sign ($) at the end of the variable names, you should see that the first four lines are just concerned with assigning strings to string variables.

While lines 30 and 40 aren't really necessary I've put them in as listing is easier to follow if you type in the names rather than a space or a full stop when lines get complicated. Line 50 could be:

```
50 weather$=moggy$+" "+"and"+" "+mutt$
```

but those spaces are asking for trouble. As the program carries on *weather$* is created by concatenation and line 60 prints out the message. Can you see why:

```
60 PRINT "It's raining" space$+weather$+
fullStop$
```

produces the same output as the previous line 60?

## Old and New

By now you should have grasped how CLS clears the screen but leaves the program in memory intact. Sometimes you'll want to get rid of a program completely.

The way to do this is to use the command NEW. Try it and see. Any program in memory disappears. You can't LIST it and you certainly can't RUN it.

NEW is a very powerful command, to be used with care. Happily if you do use it by mistake and you haven't typed in any other program lines, you can recall the program with OLD. Try it and see.

## Order, order

Although they're very different the previous two programs do have a lot in common.

For a start they sit in memory not doing anything until they're RUN. And they can be listed out with LIST. But there's more than that.

Have you noticed anything about the RUN command? All it does is tell the Electron to run the program but it doesn't tell it where to start.

The Electron figures this out for itself by looking at the line numbers (the numbers found at the beginning of the program lines) and picking the lowest it can find.

It performs this line (in both the above programs it was line 10) and then looks for another. Again it picks the lowest number it can find that hasn't been performed. In this case it's 20. Once that's done, it goes on to the next line and so on.

Now this might seem fairly obvious but it's quite important to grasp that the Electron runs its programs one line at a time, one after the other in a fixed sequence. And this sequence depends on the line numbers.

Having said that, how does the Electron know when to stop? The answer is that the program stops when the Electron can't find any more lines left to run.

In the first program this is after it has processed line 40; in the second after it has dealt with line 60. There are no more lines left so the program halts.

Try typing in the following program exactly as it stands:

```
20 PRINT 'of entry'
40 PRINT 'matter'
10 PRINT 'The order'
30 PRINT 'doesn't'
```

As you can see, the line numbers don't follow any specific order. First there's line 20, then line 40, next line 10 and finally line 30. It's a right jumble.

So what's going to happen when we RUN the program? Will the screen show:

```
of entry
matter
The order
doesn't
```

or:

```
The order
of entry
doesn't
matter
```

Again, try it and see. And if you've understood what you've read about the Electron always looking for the lowest line number and starting from there, you should have no difficulty in seeing why it's the second lot of output that appears.

Just to confirm it, do a quick LIST which will show:

```
10 PRINT 'The order'
20 PRINT 'of entry'
30 PRINT 'doesn't'
40 PRINT 'matter'
```

proving that even though you entered the lines in the wrong order, the Electron can still sort them out.

## The intentions of numbering in tens

Still on the subject of line numbers have a look the next program:

```
23 PRINT 'Look at'
67 PRINT 'these'
103 PRINT 'line numbers'
```

and see if you can spot what's different.

The answer is, of course, that the line numbers look wrong. Up to now all our programs have had the lines numbered 10, 20, 30 and so on.

In other words they've started at 10 and gone up in 10s. With this program it's very different. The question is, will it still work when you enter RUN?

The answer is yes. The program doesn't have to start at line 10, it can start at almost any number. And successive lines don't have to go up in 10s.

The Electron just picks the lowest numbered line and does it, then looks for the next lowest, does that and so on.

From this you'll see that it's perfectly possible to have a program:

```
1 PRINT 'Programming'
2 PRINT 'is'
3 PRINT 'easy'
```

where the line numbers start at 1 and go up in 1s. However, while the Electron will accept it and the program will work, it's not very flexible.

Suppose you wanted to add another line between lines 2 and 3. What line number would you use for it? 2.5?

Try it and see. You'll find that Basic only allows whole numbers at the beginning of lines.

This is why it's normal to number the lines as we have done, starting at 10 and going up in 10s. To see it, modify the program so 1, 2 and 3 are replaced by 10, 20 and 30.

However, don't bother using NEW to get rid of the 1, 2, 3 program, the Electron will rejig the line numbers into the usual pattern for you. All it needs is the command RENUMBER (not forgetting to press Return).

The result is that the program becomes:

```
10 PRINT 'Programming'
20 PRINT 'is'
30 PRINT 'easy'
```

as you'll see if you LIST it.

Now if we want to slip in another line, it's easy. Just pick a line number that comes in between the numbers of the lines that will be on either side of the new line. So if we add:

```
25 PRINT 'not'
```

a LIST will show the program as:

```
10 PRINT 'Programming'
20 PRINT 'is'
25 PRINT 'not'
30 PRINT 'easy'
```

Try doing that when the line numbers are 1, 2 and 3! Notice that I picked 25 when I could have used 22 or 27 or any number between 21 and 29. Can you think why?

And, to keep the line numbering to our standard, do a quick RENUMBER which renumbers the program as:

```
10 PRINT 'Programming'
20 PRINT 'is'
30 PRINT 'not'
40 PRINT 'easy'
```

Finally, since the program doesn't tell the truth, get rid of line 30 by typing in 30 and pressing Return. The result is:

```
10 PRINT 'Programming'
20 PRINT 'is'
40 PRINT 'easy'
```

You'll see from this that just typing in a line number by itself and pressing Return deletes that line from the program.

And unlike after NEW, you can't use OLD to fetch it back. It's gone for ever.

For practice, play around with line numbers – and see if you can answer these questions:

Can you use 0 as a line number?

What's the highest line number you can have?

● And that is where we part company for this month. Next time we'll be looking at more programs.

# Cartridge survey

## ROLAND WADDILOVE evaluates eight of the market leaders

ONE of the most useful features of the BBC Micro is its ability to access software on rom. Five sockets are provided on the main circuit board, two are taken up by the operating system and Basic which leaves three empty.

These sockets are commonly filled with a DFS, word processor, toolkit or whatever.

Although the Electron has the software within its operating system to enable it to access sideways roms, unfortunately it hasn't got the hardware to enable them to be plugged in.

However, adding a Plus 1 provides you with two multipurpose sockets (among other things), which can be put to a variety of uses.

Perhaps the most common use is for cartridges containing software on rom, and probably the most well known of these is Acornsoft's View.

These cartridges contain an ordinary rom soldered on to a small PCB, and unless you're pretty adept with a soldering iron they can't be used for any other rom software.

Fortunately many third party hardware suppliers can provide blank cartridges. These contain an empty rom socket mounted on a small PCB.

The advantage of a blank cartridge is that it can be used for any rom software — simply plug the rom in the socket and plug the cartridge in the Plus 1.

The cartridge is reuseable so you can unplug it at any time, open it up and replace the rom with another.

There are many cartridges to choose from — take a look at the photograph accompanying this article. So what are the advantages and disadvantages of each and which is the best?

There are no simple answers here because it all depends on what you require from your cartridge, and my needs are probably different from yours.

Ask yourself how many roms you are likely to buy before deciding on any particular one. Do you need one socket, two or more? Are you going to be swapping roms frequently?

If you are likely to be buying several roms, obviously you'll need several sockets and the Expandor Systems board is probably best in these circumstances.

This will take up to four roms and a bank of four switches enables you to select any rom, though you can only use one at a time.

Are you going to be inserting and removing roms regularly? If so, a cartridge with ZIF sockets would be an advantage. A ZIF socket — Zero Insertion Force — means that it requires little effort to insert the rom.
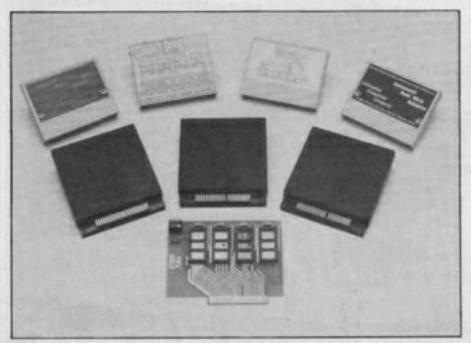
The pins on a rom are quite easy to bend when pushing it into a socket and it's quite easy to ruin a perfectly good unit. A ZIF is designed to prevent this from happening.

Care Electronics cartridges can be supplied with either one ZIF and one ordinary socket or two ZIF sockets.

If you simply want to use one particular rom, ACP's Advanced Rom Adaptor 1 is well worth considering. It contains a single socket and is also quite cheap.

However, for a couple of pounds more Slogger's cartridge enables you to plug in two roms and the sockets are slightly better as well.

To sum up, each cartridge has its advantages — it all depends on what you require. My advice is to first decide how many and which roms you intend to buy, then choose the cartridge which enables you to use them best. ∎

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*Products: Advanced Rom Adaptor 1 (£10.35)*
*Advanced Rom Adaptor 2 (£14.95)*
*Supplier: Advanced Computer Products, 6 Ava House, High Street, Chobham, Surrey GU24 8LZ.*
*Tel: 0276 76545*

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*Product: Peartree Master Cartridge*
*Price: £9.14*
*Supplier: Peartree Computers, St George's House, 14 George Street, Huntingdon, Cambs PE18 6BD.*
*Tel: 0480 50595*

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*Product: Slogger Twin Rom Cartridge*
*Price: £12.95*
*Supplier: Slogger, 107 Richmond Road, Gillingham, Kent ME7 1LX.*
*Tel: 0634 52303*

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*Product: Standard cartridge with two IC sockets (£7.95). Cartridge with one Zif and one IC socket (£13.57). Cartridge with two Zif sockets (£18.63).*
*Supplier: Care Electronics, 800 St Albans Road, Garston, Watford, Herts WD2 6NL.*
*Tel: 0923 672102*

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*Product: Eprom Plus*
*Price: £15.95*
*Supplier: Expandor Systems, 99 Staley Hall Road, Stalybridge, Cheshire SK15 3DP*
*Tel: 061-303 7646*



*Top row (left to right): Advanced Rom Adaptor 1, Peartree Master cartridge, Slogger Twin Rom cartridge, Advanced Rom Adaptor 2.*
*Middle row: the Care range.*
*Bottom row: Eprom Plus*